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LAND TRANSPORT IN ROMAN EGYPT

A STUDY OF ECONOMICS AND
ADMINISTRATION IN A ROMAN PROVINCE



Colin Adams

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*A Study of Economics and Administration
in a Roman Province*

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For Jo and Caitlin

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Preface

This monograph began as an Oxford DPhil thesis, written at Christ Church and completed in December 1996. It is much revised and rewritten, for on many points of detail I have changed my mind, either in the light of evidence published subsequently or because on reconsideration I thought my original interpretations wrong. I have tried as far as possible to include all relevant ancient evidence and modern literature that has been published since 1996. In some areas—principally with relevance to the Eastern Desert—considerable material has appeared. I am aware that land transport is only one part of the transport system in Egypt, and therefore this study can only present part of the picture. It might serve, however, as a study of a major part of the economics of transport, and provide a starting point for other work. As such, it is intended to be both a point of reference for papyrologists engaged in reading texts, but also hopefully of some interest to economic historians, for it considers issues fundamental to the workings of the Roman imperial economy.

A number of publications came too late to be incorporated fully in the text. Several documents of clear relevance have been published in *P. Oxy.* LXIX. I have not been able to see the recent Oxford DPhil thesis by Michel Cottier on taxes and customs duties.

Many debts have been incurred during the long process of working on this material. In Oxford as a graduate student I benefited greatly from the help and advice of John Rea, Revel Coles, and Fergus Millar (who has constantly encouraged me to bring the study to publication). My friends and contemporaries Nikolaos Gonis and Michael Sharp provided a forum for discussion; Nick continues to be of great help as an advisor on papyrological matters. My examiners Peter Parsons and Dominic Rathbone made many useful comments, of which I have tried to incorporate as many as possible. The former kept me well nourished at High Table in Christ Church. Many friends at Oxford and elsewhere—Tom Harrison, Kevin Bradshaw, Jon Coulston and Hazel Dodge, Roger and Aileen Rees, Brian Campbell, John Curran, Anne Kolb and John Vanderspoel—provided company,

advice, and support in many ways and over many years. Steve Sidebotham kindly read the whole text and offered many useful suggestions for its improvement, and I benefited greatly from his unrivalled knowledge of the Eastern Desert of Egypt. Tom and Clare Litt provided hospitality on many trips to the libraries of Oxford, and Matthew Gibbs provided frequent help with references and photocopies.

The monograph was largely completed during a British Academy Postdoctoral Fellowship, for which I thank the Academy, and work continued during my appointment at the University of Leicester. A period of study leave allowed for more revisions. My colleagues in the School of Archaeology and Ancient History provided a supportive and friendly environment in which to work, and I must thank especially Graham Shipley, Lin Foxhall, Graeme Barker, David Mattingly, David Edwards, Jonathan Prag, and Marijke van der Veen. Graham Shipley read and commented upon a number of sections; Lin Foxhall and Hamish Forbes discussed matters of animal husbandry; and Marijke van der Veen advised on the food supply of the Eastern Desert. David Edwards cast a perceptive eye over the whole. My thanks to Debbie Miles Williams for preparing the maps and to Helen Foxhall Forbes for compiling the Index Locorum. Final corrections were made after my appointment at the University of Liverpool, and I thank Chris Mee for his allowing me time free from teaching and other commitments, which allowed for completion.

My greatest debt, however, is to Alan Bowman, who supervised the thesis and has given much needed advice and support in the years since. He has constantly urged me to complete what follows, and most importantly helped to convince me that it is worthwhile. If there is any merit, it is due to him. For any shortcomings, neither he nor any of the above are responsible.

My family has always provided support. My mother, father and brother have been supportive in every way, and their love and encouragement means everything. My wife Jo and daughter Caitlin are at the centre of my life. They tirelessly endure the demands of academia, and they, with the ever-willing support of Heidi and Jasper, create an environment without which nothing would be possible. The book is dedicated to them with love.

Colin Adams

Notes for the Reader

ABBREVIATED REFERENCES

Papyri, ostraca and other documents are referred to according to the conventions listed in J. F. Oates, *et al.*, *Checklist of Editions of Greek, Latin, Demotic and Coptic Papyri*, 5th edn (BASP Supp. 9, 2001). This is regularly updated and available on the World Wide Web at <http://scriptorium.lib.duke.edu/papyrus/texts/clist.html>. Also indispensable is H-A. Rupprecht, *Kleine Einführung in die Papyruskunde* (Darmstadt, 1994). Where reference is made to commentaries of documents in papyrological editions, these are signalled by the use of page numbers rather than text numbers, with the customary p. or pp. References to the standard work on corrections to papyri, F. Preisigke, *et al.*, *Berichtigungsliste der griechischen Papyrusurkunden* (Berlin-Leipzig, 1913–), are made according to volume and page number, and where it is necessary to provide a number of corrections in volumes I–VII, the reader is referred to the concordance (W. Clarysse, R. W. Daniel, F. A. J. Hoogendijk and P. van Minnen, *Konkordanz und Supplement zu Berichtigungsliste Band I–VII* (Leuven, 1989) using the abbreviation *BL Konkordanz*).

Abbreviations used for periodicals can be found in the *Checklist* (101–2) and in Rupprecht, *Kleine Einführung*, 221–2. Abbreviations for periodicals not specific to papyrology can be found in *L'Année Philologique* (Paris, 1927–). When referring to inscriptions, I have chosen to use *IGRR* and *OGIS* rather than the misleading *IGRom* or *OGI*. Books and articles are referred to in full in the footnotes when they first occur, and thereafter by abbreviated titles.

TECHNICAL TERMS

Some important technical terms are described below. I have refrained from quoting extensive passages in Greek, but technical terms are

usually given in Greek in the first instance, and subsequently in transliteration; short passages of Greek are translated. Those unfamiliar with the political structures of Graeco-Roman Egypt will find accessible treatments in: N. Lewis, *Life in Egypt under Roman Rule* (Oxford, 1983); A. K. Bowman, *Egypt after the Pharaohs: 332 BC–AD 642: From Alexander to the Arab Conquest*, 2nd edn (Oxford, 1996); id. 'Egypt', in A. K. Bowman, E. Champlin, and A. Lintott (ed.), *Cambridge Ancient History X²* (Cambridge, 1996), 676–702. A useful guide to Egyptian months and how they relate to the agricultural year can be found in Lewis, *Life in Egypt*, 115–16.

WEIGHTS AND MEASURES

aroura—'tilled or arable land', but came to be used as a land measurement, equal to 0.68 acres (0.275 hectares).

artaba—unit of measure of produce. There were different sizes of artaba, ranging from 24 to 42 choinikes. The standard artaba seems to have been 40 choinikes (c.43 litres). See D. Rathbone, 'The weight and measurement of Egyptian grains', *ZPE* 53 (1983), 265–75.

choinix—dry measure, roughly 1 litre.

chous—liquid measure, roughly 1.5 litres.

drachma—a unit of measure, but also the basic unit of currency. In the Roman period, the drachma was minted as 4-drachma pieces (tetradrachmas), normally called 'drachmas in silver' in documents, whereas 'drachmas in bronze' usually denotes the weight equivalent in smaller coin. One tetradrachma equals 1 denarius (4HS).

keramion—measure used for wine and oil. There were two sizes, 6 choes (c.9 litres), and 8 choes (c.12 litres).

obol—one-sixth of a drachma, so 24 obols should be 1 tetradrachma, but in fact it was usually 28 or 29 obols.

talent—a measure of weight (c.44 kg), or a monetary unit of 6000 drachmas.

TRANSPORT LITURGIES

ἀγγαρεία—general provision of transport.

ἐπιπλωία—‘super-cargo’, protection of grain on board ship.

ἐπιστολαφορία—‘letter-carrying’.

καμηλασία—provision of camels.

καταγωγή—the ‘carrying down’ of state grain for the *annona*.

κτηναρκία—provision of animals.

ὄνηλασία—provision of donkeys.

παράλημψις ἰδιωτικῶν ὄνων—supervision/collection of privately owned donkeys.

παρουσία—rarely attested and probably short-lived, specific liturgies in response to short-term needs.

- ἐπιμελητῆς ζώων ἀποστελλομένων εἰς τὴν Βαβυλώνα
- ἐπὶ τῆς κριθῆς
- ἐπὶ κτηνῶν

ῥαβδουκία—supervision of animals.

See generally, N. Lewis, *The Compulsory Public Services of Roman Egypt*, 2nd edn (Florence, 1997).

EGYPTIAN MONTHS

Thoth: 29 August–27 September

Phaophi: 28 September–27 October

Hathur: 28 October–26 November

Choiak: 27 November–26 December

Tybi: 27 December–25 January

Mecheir: 26 January–24 February

Phamenoth: 25 February–26 March

Pharmouthi: 27 March–25 April

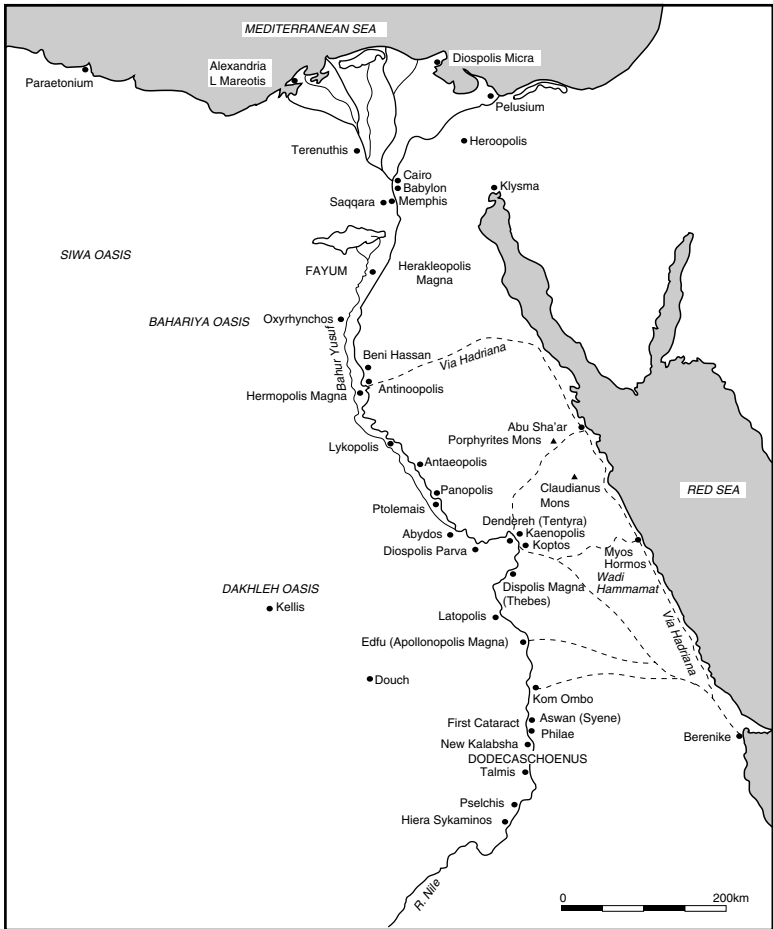
Pachon: 26 April–25 May

Pauni: 26 May–24 June

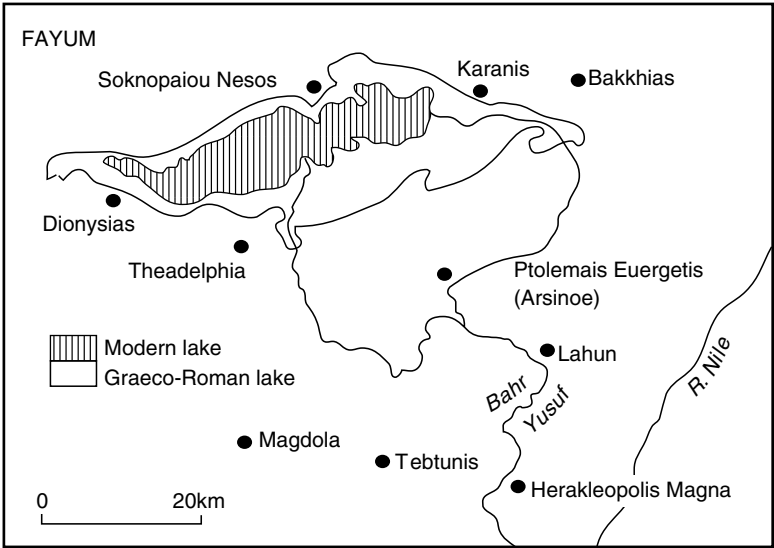
Epeiph: 25 June–24 July

Mesore: 25 July–23 August

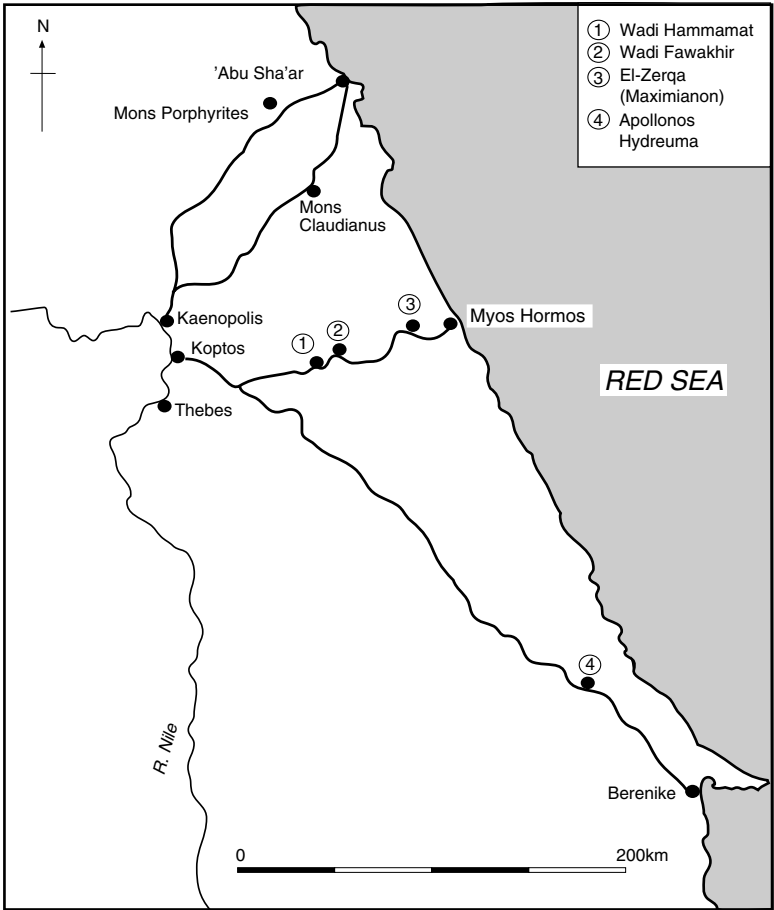
Epagomenal days: 24 August–28 August



Map 1: Roman Egypt (amended from A. K. Bowman, *Egypt after the Pharaohs*, 2nd edn (Oxford, 1996))



Map 2: The Fayum (Arsinoite nome)



Map 3: The Eastern Desert of Egypt

Part I

Setting the Scene

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Introduction: Transport and the Economy of the Roman World

Transport has been described as ‘the greatest failure of ancient technology’.¹ Limitations in both water and land transport are very much at the centre of any serious study of the economy of the ancient world, for they are seen to be one of the main contributing factors to the absence of *growth* in its economy. This was dictated by two main factors: first, similarities in climate and topography in the Mediterranean basin meant that regions had the same needs and surpluses; second, that transport was costly, especially by land, which further restricted the movement of goods and growth of trade. There is little doubt as to the similarity of climate in the region, but it is all too easy to exaggerate this; there was clearly at the same time a great regional diversity. The Roman empire was not confined to the Mediterranean, but ran from the shores of the Atlantic to those of the Black and Red Seas, and included landscapes as diverse as the Alps and the Sahara. There is good reason, however, to question the validity of the belief that transport was inefficient. It was, of course, by modern standards, but it is only in the last three centuries that major advances in technology have facilitated easy, if not cheap, transport. Recent work, however, has shown not only the great diversity and complexity of the whole region (and beyond) in antiquity, but also what has been described as its ‘connectivity’, a mobility of both goods and people not paralleled until recent times.²

¹ P. A. Brunt, review of K. D. White, *Roman Farming* (London, 1970), *JRS* 62 (1972), 156.

² P. Horden and N. Purcell, *The Corrupting Sea: A Study of Mediterranean History* (Oxford, 2000). Also central is M. McCormick, *Origins of the European Economy: Communications and Commerce AD 300–900* (Cambridge, 2001). See also the

There have been a considerable number of studies devoted to transport by sea,³ but land transport, usually seen as the poor relation, has received less attention, despite the well-established importance of Roman roads.⁴ The prevailing view has been that, while sea travel was severely affected by seasonal weather and the inability of ancient ships to sail close to the wind, it still remained an efficient and cost-effective form of transport. Travel by land, on the other hand, was certainly affected by difficulties of terrain and brigandage, but most importantly was expensive. By far the most important and influential statement of this view is by A. H. M. Jones.⁵ Basing his calculations on the costs of transport established by Diocletian's *Edict of Maximum Prices* and the cost of transporting wheat, he calculated that a wagon-load of wheat with a value of 6000 denarii would double in price if transported 300 miles, and a camel-load's value would double if carried 375 miles. Sea freight, he argued, was much cheaper, and ultimately it was 'cheaper to ship grain from one end of the Mediterranean to the other than to cart it

fundamentally important work of S. D. Goitein, *A Mediterranean Society: The Jewish Communities of the World as Portrayed in the Documents of the Cairo Geniza*, 6 vols (Berkeley, 1967) and F. Braudel, *La Méditerranée et le monde Méditerranéen à l'époque de Philippe II* (Paris, 1949) and in translation, id., *The Mediterranean and the Mediterranean World in the Age of Philip II*, trans. S. Reynolds (London, 1972).

³ The most important and wide-ranging work is L. Casson, *Ships and Seamanship in the Ancient World*, 2nd edn (Baltimore, 1995); also J. Rougé, *Recherches sur l'organisation du commerce maritime en Méditerranée sous l'empire romain* (Paris, 1966). Archaeological research on shipwrecks is of clear importance here, see A. J. Parker, *Ancient Shipwrecks of the Mediterranean and the Roman Provinces* (Oxford, 1992) and id., 'Sea transport and trade in the ancient Mediterranean', in E. E. Rice (ed.), *The Sea and History* (Stroud, 1996), 97–110.

⁴ Of greatest importance are W. L. Westermann, 'On inland transportation and communication in antiquity', *Political Science Quarterly* 43 (1928), 364–87; C. A. Yeo, 'Land and sea transport in imperial Italy', *TAPA* 77 (1946), 221–44; A. Burford, 'Heavy transport in classical antiquity', *Economic History Review* 13 (1960), 1–18. More recently, see D. Sippel, 'Some observations on the means and cost of the transport of bulk commodities in the late Republic and early empire', *Ancient World* 16 (1987), 35–45. On roads, the classic work is R. Chevallier, *Roman Roads* (London, 1976), translated from the original French edition. More recently, see R. Laurence, *The Roads of Roman Italy: Mobility and Cultural Change* (London and New York, 2000).

⁵ A. H. M. Jones, *The Later Roman Empire 284–602*, 2 vols (Oxford, 1964), ii 841–4, discussing the charges for transport recorded in Diocletian's *Edict of Maximum Prices* (*Ed. Diocl.* 17. 3–5). See more recently, Laurence, *Roads of Roman Italy*, 95–100.

75 miles.⁶ Similarly expensive land transport costs, much earlier in the Roman period, are noted by Cato in his discussion of the cost of buying and transporting an olive mill. His figures suggest that the cost of transporting the mill 25 miles amounted to 11 per cent, while transporting it 75 miles increased this to 39 per cent.⁷ No clearer statement of these problems is made than the observation of Pliny the Younger, in a well-known letter to Trajan:

There is a large lake, not far from Nicomedia, over which marble, foodstuffs, timber, and materials for building are easily and cheaply transported as far as the road; after which all has to be transported to the sea, with much effort and greater expense.⁸

On this evidence, the first a notoriously difficult, misleading and often misunderstood inscription, the second a treatise less on the technicalities of farming than a cultural ideal, and the third, a vague and unquantifiable statement, much of the view of the comparative cost of transport in the ancient economy rests.

The conventional view was challenged by Burford, who argued that long-distance transport of bulky goods was feasible, a view with which Brunt disagreed, stating: 'she merely showed what governments could do, regardless of cost, for defence, prestige or piety; it was no more possible for private entrepreneurs to emulate them than for IBM to put men on the moon.'⁹ The conventional view received firm support from Finley in his highly influential model of the ancient economy, though the term 'model' might seem alien to Finley's 'primitivist' approach.¹⁰ Indeed it is a central feature of Finley's work,

⁶ Jones, *Later Roman Empire*, 842.

⁷ Cato, *Agr.* 22. 3. See the discussion of Laurence, *Roads of Roman Italy*, 95–100, who notes inadequacies in the calculations of Yeo, 'Land and sea transport'.

⁸ Pliny, *Ep.* 10. 41. 2.

⁹ Burford, 'Heavy transport'; Brunt, *JRS* 62 (1972), 156.

¹⁰ M. Finley, *The Ancient Economy*, 3rd edn (Berkeley and Los Angeles, 1999). Finley adopted a very different approach to that of M. Rostovtzeff, *The Social and Economic History of the Roman Empire*, 2nd edn (Oxford, 1957), who offered a more modernizing approach. Finley was further supported, using different methods, by R. Duncan-Jones, *The Economy of the Roman Empire: Quantitative Studies* (Cambridge, 1974), esp. 1, where he states: 'despite the existence of a comprehensive network of trunk roads, land transport remained so costly and inefficient that it was often impossible to relieve inland famines from stocks of grain elsewhere'. Here he echoes Finley, *Ancient Economy*, 127.

whether explicit or implicit, that the economic elements Finley claimed were absent—trade, economic rationality, occupational specialization—were at varying levels factors that were dependent upon or affected transport. Ultimately, Finley stated that individuals could not move bulky merchandise long distances by land as a normal activity, nor could any but the wealthiest and most powerful communities. As he puts it, ‘most necessities are bulky—cereals, pottery, metals, timber—and so towns could not safely outgrow the food production of their own immediate hinterlands unless they had direct access to waterways.’¹¹ But the evidence on which these observations were made remained the same, and had the same flaws. Briefly, these flaws were that Diocletian’s edict and Cato’s calculations depended on the assumption that transport was hired; in reality this might not always have been the case. Transport costs might often be hidden or even unimportant if farmers transported their own produce on their own animals, or could cheaply hire or borrow animals, perhaps from friends or relations. The economics behind this were as clear then as they are today: that it was often cheaper to transport one’s own materials than to hire transporters. Fluctuations in market price, which would certainly have affected the relative cost of transport, are not taken into account, or are even assumed not to have been important. Finally, and crucially, they argue from particular circumstances (which in themselves may have been unusual) for a general validity.¹²

A more complex model of the Roman economy has been postulated by Keith Hopkins; the so-called ‘taxes and trade’ model.¹³ His basic premise was that Rome’s imposition of taxes in

¹¹ Finley, *Ancient Economy*, 126.

¹² The circumstances of Diocletian’s edict were not typical, nor is its purpose clear; see most recently J. Ermatinger, *The Economic Reforms of Diocletian* (St Katharinen, 1996) for discussion, although Ermatinger tends to an over-zealous view of Diocletian as a reformer. Few commentators note that, with respect to Cato’s olive press, this was an unusual item of equipment, which would have long use on his estate. The economics behind the transport of an item of long-term hardware are clearly different from those of a perishable foodstuff, bulky or otherwise.

¹³ K. Hopkins, ‘Taxes and trade in the Roman Empire’, *JRS* 70 (1980), 101–25; Hopkins offered an update to this in, id., ‘Rome, taxes, rents and trade’, *Kodai: Journal of Ancient History* 6/7 (1995/6), 41–74, reprinted in W. Scheidel and S. von Reden (ed.), *The Ancient Economy* (Edinburgh, 2002), 190–230. On Egypt, see P. van Minnen, ‘Agriculture and the “taxes-and-trade” model in Roman Egypt’, *ZPE* 133 (2000), 205–20.

its empire itself stimulated trade, for, in order to pay their taxes, individuals had to sell their produce. So regional economies were stimulated, and this accompanied a growing sophistication and scale in production and manufacture, with increased monetization. Hopkins's model had a profound effect on the study of the Roman economy, but recent work has tried to balance this with Finley, for no model can account for the complexity of Roman economic behaviour, even if it provides a genuinely important way of thinking about it.¹⁴

On the issue of transport, Hopkins interestingly suggested that although it was certain that sea and river transport were important, one major point was usually omitted in discussions of the relative importance or cost when compared to land transport: land transport was an essential part of a larger system of transport, for goods had to be taken to ports by land in most cases. An obvious, but important observation. It is simplistic to separate land, river and sea travel into separate units, for, in the course of many journeys, more than one mode of travel will be used.¹⁵ Human movement and transport are governed by six main factors: the location of populations; their size; the geography and topography of the region to be traversed; transport technology; the products to be transported; and finally cultural and

¹⁴ On competing models of the economy, among older works, see J. H. D'Arms, 'M. I. Rostovtzeff and M. I. Finley: the status of traders in the Roman World', in *Ancient and Modern: Essays in Honor of G. F. Else* (Ann Arbor, 1977), 159–79, with fuller treatment in id. *Commerce and Social Standing in Ancient Rome* (Cambridge, Mass., 1981). More recently, there have been very useful surveys by H. W. Pleket, 'Wirtschaftsgeschichte der römischen Kaiserzeit', in F. Vittinghoff (ed.), *Handbuch der Europäischen Wirtschafts- und Sozialgeschichte* 1 (Stuttgart, 1990), 25–160, and W. V. Harris, 'Between archaic and modern: some current problems in the history of the Roman economy', in id. (ed.), *The Inscribed Economy* (Ann Arbor, 1993), 11–29; see also S. Meikle, 'Modernism, economics and the ancient economy', *PCPS* 41 (1995), 174–91, reprinted in Scheidel and von Reden, *Ancient Economy*, 233–50; most recently, J. G. Manning and I. Morris (ed.), *The Ancient Economy: Evidence and Models* (Stanford, Cal., 2005), and within it, specifically on Egypt and papyri, R. S. Bagnall, 'Evidence and models for the economy of Roman Egypt', in Manning and Morris, *Ancient Economy*, 187–205.

¹⁵ See the interesting comments of McCormick, *Origins of the European Economy*, 66. See also, F. Braemer, 'La coordination de la voie d'eau et de la route terrestre dans l'Antiquité romaine: Villes de transbordement', in *La Ville et le fleuve. Colloque tenu dans le cadre du 112e Congrès national des Sociétés savants*, Lyon, 21–25 avril 1987 (Paris, 1989), 109–21.

political considerations.¹⁶ With these in mind, it is not acceptable to state that transport was restricted in antiquity simply because of its cost.

TRANSPORT IN ROMAN EGYPT

We must now turn to the Egyptian evidence. There is little doubt that the Nile dominated almost every facet of life in Egypt, and its importance to transport and communication is clear. Perhaps this is the reason why Egypt and its rich papyrological evidence has been left out of discussions on the nature and feasibility of land transport in the classical world. Land transport has always been seen as marginal in the presence of such a river. There is no doubt that the Nile was central, but it is the purpose of this book to study land transport in order to establish its place in an overall *system* which included river transport. Produce had to be transported by land, whether through human portage or by pack animal or wagon. Not all parts of the Nile Valley and its environs were close enough to the river to negate this requirement, and not all had access to navigable irrigation channels or canals that might facilitate transport. The Fayum is worthy of note in this respect, lying as it did, at some points, as far as 100 km from the Nile. Land transport in this region assumed a particular importance; as did the deserts, both Eastern and Western. Communities in these marginal regions were supplied from the Nile Valley and beyond, and the Eastern Desert formed the conduit for trade luxuries between the Roman empire and the East. This trade and the supply of the region were on a very large scale. The oases of the Western Desert were very different in that they were not the focus of such intensive trade, but it is clear that they were inextricably linked to the Valley communities, and indeed that considerable wealth was generated through these connections. The distances involved were considerable, and it is certain that non-luxury, bulky produce such as olive oil was transported in these regions, and that it remained possible for it to compete with other produce at market. For this reason alone, it seems that a study

¹⁶ Stated by McCormick, *Origins of the European Economy*, 65.

of land transport in Egypt is worthwhile. Another reason is that despite its clear importance, and the volume of evidence for it, it has largely been neglected.

PAPYRI AS EVIDENCE FOR THE ECONOMY

Apart from the work of A. C. Johnson, papyri have not figured heavily in the study of the ancient economy until relatively recently.¹⁷ Finley was acutely disparaging, describing them as 'a paperasserie on a breathtaking scale and an equally stupendous illusion'.¹⁸ Such staggering bias is, thankfully, no longer tenable. Recent work has demonstrated the important role that papyri can play in the study of economies, not only of Egypt, but of the Roman empire more generally.¹⁹ Not only that; the distinctiveness of Egyptian papyri is no longer so stark, for similar evidence is beginning to appear from other parts of the Roman empire, from the Vindolanda tablets from Britain to papyri and ostraca from the Near East and Africa. Similar documents show similar phenomena, the most important feature being the similarity in approaches to the farming of marginal land in desert regions. Also of great importance is the recent combination of the study of documents from Egypt with archaeology, particularly in the desert regions; documents are now studied not only in their archaeological context, but in a manner more fully informed by the full range of archaeological approaches.

Even if the uniqueness of Egypt and its papyri can no longer be argued with any cogency, historians must be mindful of problems in the interpretation and application of evidence.²⁰ Papyri are unevenly distributed through time and in place. The chronological span of this

¹⁷ A. C. Johnson, 'Roman Egypt from Augustus to Diocletian', in T. Frank (ed.), *An Economic Survey of Ancient Rome*, vol. 2 (Baltimore, 1936).

¹⁸ M. I. Finley, *Ancient History: Evidence and Models* (London, 1985), 34.

¹⁹ See most importantly D. Rathbone, 'The ancient economy and Graeco-Roman Egypt', in L. Criscuolo and G. Geraci, *Egitto e storia antica dall'ellenismo all'età araba: bilancio di un confronto* (Bologna, 1989), 159–76, reprinted in Scheidel and von Reden, *Ancient Economy*, 155–69.

²⁰ The most recent, and best, treatment of papyri is R. S. Bagnall, *Reading Papyri, Writing Ancient History* (London and New York, 1995).

book ranges from 30 BC to about AD 300; some parts of this period are better represented than others. For example, on the first century AD, and the important period of transition from Ptolemaic kingdom to Roman province, we are ill-informed. Much of our evidence is concentrated in the second and third centuries AD, so it is sometimes difficult to establish continuity, and often difficult to say for certain when a particular reform or institution of a particular official or liturgy took place. Problems in the temporal spread of evidence are complicated still further by the geographical distribution of our texts, which is largely determined by patterns of preservation. We have few texts from the Delta region, the most highly populated and most important agricultural region. The corollary is that we have little or no direct evidence for the centre of administration in Alexandria.

Similar problems impact on our understanding of other regions within Egypt. The Fayum has produced by far the greatest number of papyri, the Nile valley—most notably with the exceptions of Oxyrhynchos, Hermopolis, Panopolis and Antinoopolis—has produced far fewer. We are then left with the question of how typical our evidence from the Fayum is of the rest of Egypt, especially in view of regional diversity in matters of administration and taxation. Even within the Fayum, our evidence hails mainly from outlying villages rather than the metropolis, so we lack clarity on a major issue, the relations between metropolis and nome. These are general problems that compound the inherent difficulties of using archival and often anecdotal evidence to assess broader historical questions; moving from the particular to general.

However, it is all too easy to be disparaging of our evidence. What we *do* have is a roster of evidence on papyri, ostraca, and, to a lesser extent, stone, that is second to none. We have two of the best-documented sites of the ancient world—Oxyrhynchos and Mons Claudianus—and the bonus that we can be confident that our knowledge of Roman Egypt will grow as our evidence continues to multiply. Mons Claudianus and Karanis in the Fayum are especially important in that they have yielded a huge amount of documentary evidence that, importantly, can be placed in an archaeological context.²¹ Few would now dispute the importance of papyri for

²¹ For Karanis, see P. van Minnen, 'House to house enquiries: an interdisciplinary approach to Roman Karanis', *ZPE* 100 (1994), 227–51.

the study of economic history, and the notion that Egypt was different from other provinces (as if there was a 'standard' province) has been forcefully refuted.²² The evidence is neither banal nor hopelessly ephemeral, but rather is a solid guide to economic, administrative, and social behaviour, not only within Egypt, but which can provide insights into similar phenomena throughout the Roman world.

QUANTIFYING TRANSPORT COSTS IN THE PAPYRI

The real strength of papyri is that the evidence they provide allows for some quantification. How, then, does our Egyptian evidence sit with the theories on transport and economics discussed above?

The information we need is the cost of transport, distances travelled, wage costs for transporters, and the cost or value of commodities transported. Even with the copious information on cost and wage level that we possess, our picture is far from complete. Evidence for prices has been gathered by Hans-Joachim Drexhage, and it would serve little purpose here laboriously to list every detail in tabular form.²³ Rather, it seems best to offer an analysis of the evidence Drexhage has provided, and offer a distilled interpretation of transport costs, bearing in mind that prices and wages varied according to location and availability of transport, commodities, or labour, and that there were seasonal, temporal, and market-driven fluctuations in cost.

If we consider the cost of transporting 100 artabas of wheat a distance of 100 km, judging by the normal load for donkeys (3 artabas), 33 animals would be required. The operation would take 2 days, and animal hire would cost 33 drachmas,²⁴ with an additional 6 drachmas for donkey drivers. These are average prices

²² A. K. Bowman and D. W. Rathbone, 'Cities and administration in Roman Egypt', *JRS* 82 (1992), 107–27.

²³ H.-J. Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne im römischen Ägypten* (St Katherinen, 1991), esp. 337–50.

²⁴ On the cost of animal hire, see Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 313–16.

for the first century, and thus, in this period, a total of 39 drachmas is a speculative average cost. The price of wheat per artaba varied considerably, from 3 drachmas (e.g. SBIV 7341 (AD 3)) to 11 drachmas (*P. Lond.* 131 recto (AD 78/9)), but an average of 8 drachmas is workable. On this basis, we can suggest that the cost of transporting wheat 100 km was cheap; at 8 drachmas per artaba, transport costs represent c.4.9 per cent of the value of the cargo. Even if we adopt the lowest figure for the cost of wheat, 3 drachmas, transport still represents only 13 per cent of the value of wheat.

In the second century, the costs of animal hire and labour increased substantially, while the average cost of wheat remained much the same. This is probably due to a general increase in monetization, rather than an increase in real cost, and the fact that the cost of wheat stayed at an average of 8 drachmas is a sign of the general increase in prosperity in Roman Egypt, a feature of the first and second centuries AD. Our evidence suggests that the average cost of the equivalent transport was 142 drachmas, but this still only accounts for some 17.75 per cent of value. In the third century, the cost of wheat rose to an average of 12 drachmas, while the cost of transport saw a concomitant rise to 284 drachmas, or 23.66 per cent of market value.

Despite the wealth of evidence for prices and costs preserved in the papyri, due to its anecdotal and patchy nature (and its common failure to contain the full context of any particular matter), we do not have any document that preserves exactly what it cost to transport a certain quantity of wheat from point A to point B. Even if we did, this would be of little importance, as we could not assume typicality from so small a sample. It is therefore left to us to speculate. Taking the figures for the second and third centuries, Drexhage suggests that the cost of transporting 100 artabas of wheat 500 km represented 88.75 per cent and 118.33 per cent of the value of the cargo. This, he implies, fits neatly with the suggestion of Finley (based on the *Edict of Maximum Prices*) that the cost of transporting wheat 500 km would double its price.²⁵

²⁵ Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 350; Finley, *Ancient Economy*, 126.

But there are serious problems with these calculations, and they certainly offer up a distorted impression of transport cost. First, he simply calculates his estimates by multiplying the cost of transport for 100 km by five. Oddly, he does not do this for the first-century figures, which, by his method, would give a total cost of 195 drachmas (for 100 artabas at 8 drachmas per artaba), which would represent 24.37 per cent of value. We should be mindful also of the fact that these estimates are made on the market value of wheat, not on the cost of its production. Presumably the market price included a mark-up to account for transport costs, and thus these estimates massively inflate the real cost of transport. At any rate, a 500 km journey by land in Egypt is unfeasible. No one would seriously consider travelling such a distance by land in the Nile Valley (this is over half its length), and no part of Egypt lay this far from the Nile. The important issue raised by Hopkins, as we have seen, was that transport should be viewed as a system, including both land and water. This is clearly relevant here, for any interregional transport in Egypt (or indeed anywhere which had a navigable river) involved both land and river transport. It is far too simplistic to suggest that the ancient economy was stifled by high overland transport costs, when in reality very few long journeys would be made solely by land. Moreover, most movement of bulk commodities transported by land was state-driven, and thus represents a false economy.

Private transport of commodities such as wheat were at once often cheaper and more sophisticated. Owners of large estates wishing to sell surplus grain at a market would not in every case hire animals to transport it, but rather would use their own. It is likely that most private transport of these commodities then could be done in-house; only in a few cases might they resort to the hire of animals. As we shall see, professional transporters were a feature of the economic landscape of Roman Egypt, and their services were no doubt cheaper than hire, but, in an agricultural economy, it was often easier for landowners to transport commodities themselves, rather than engage a transport 'company'. Finally, a more sophisticated method of transferring grain of any type from one place to another was by letter of credit, well-attested in the accounts of *sitologoi*, officials in charge of granaries. It was not always necessary, then, to move grain from one granary to another in the course of small-scale transactions.

What is clear is that previous discussions of transport costs have presented the issue in black and white, and cannot account for the complexities of economic factors involved. It is far too simplistic to see a clear-cut division between land and water transport, and although there is no doubt that ships could carry more volume more cheaply, water transport brought with it a range of hazards and risks not experienced on land. It is meaningless and simplistic to compare them, and cannot have much relation to the real situation. In the pages that follow, it will hopefully become clear that transport by land was an important feature of economic life in Roman Egypt, and that this indicates that any notion that severe difficulties of transport by land, or any suggestion that it was prohibitively expensive, must be put to rest.

THIS BOOK

Papyri from Roman Egypt offer a detailed picture of the role of land transport within the commercial and agricultural economies of Egypt. In Part I, after considering the environment and topography of Egypt and its effect on transport, this book goes on to assess the evidence for transport resources in Egypt, pack animals and wagons, and then to examine their use. In a similar way to our ancient sources, the role of animals is taken for granted in modern works, and usually receives little attention. In the papyrological record, however, there is good evidence for trade in animals, patterns of use, the abilities of animals in terms of carrying capacity, effective working norms, and maintenance costs. This allows us to step away from the ideals of animal husbandry described in the agronomists, and to consider the realities of the economics of animal ownership and use. Although we can have no clear picture of the scale of animal ownership, it seems clear that maintenance costs (as well as initial capital outlay) were expensive. This led to strategies such as part-ownership and hire in order to keep costs low, but also meant that animal ownership was perhaps not as widespread as is generally assumed. If this is the case, then the subjects addressed in Part II, the

control of animal ownership and the requisition of animals by the state, assume a great importance because they must have imposed significant pressure on private individuals and made it difficult for farmers to provide for their own transport requirements whilst satisfying the demands of the state.

Part III focuses on a number of case studies. One of the most intensive transport operations in Roman Egypt was the transport of tax grain and was part of a system that extended directly to Rome. This was a process demanding effective central control, not least in the coordination of huge numbers of animals and drivers. The pool providing these was the agricultural economy, which must then have been affected by these demands. This was a perennial feature of life in Egypt, and different in scale to the more specialized economies of the desert regions, for which similar demands on the Egyptian population, but more limited in scale and duration, were made to satisfy demands for military supply and provisioning of the mines and quarries of the Eastern Desert. One important consequence of this was the development of a transport infrastructure in this region which stimulated and catered for trade with soldiers and workers stationed in the desert and for the valuable trade in luxuries with the East. This was no small-scale operation, and indeed what we find is a phenomenon that upsets the primitivist approach to the economy, demonstrated by the involvement of 'elites' and of specialized transporters. Finally, we return to the role of transport in the agricultural economy, in an attempt to establish economic behaviour and the effect of transport demands on farming and the labour pool.

A large proportion of land transport takes place with the 'background noise' of transport by river. I am aware of the problems of studying land transport in isolation, but the subject is large and important enough to warrant a separate treatment, and different questions can be asked. Oddly there is comparatively little evidence for river transport in Egypt, perhaps a result of the pattern of preservation of our evidence—papyri do not respond well to the poor conditions for preservation found in the highly irrigated and damp conditions of the Nile Valley. There are recent treatments of aspects of river transport, but land transport, as noted, has been neglected, despite its being part of a wider dynamic system of

transport.²⁶ Land transport took place on a large scale, even in the presence of the River Nile, and in some cases was preferred.²⁷ The Nile was not the only river in the Roman empire which provided a trade highway, and although there may have been a long tradition of river transport in Egypt, it is therefore surely the case that where large navigable rivers appear in other provinces, land transport played a significant part in a wider transport network there too. Hopefully what follows, then, can add to our picture of land transport in Roman Egypt, and might bear comparison to other parts of the Roman world.

²⁶ See A. J. M. Meyer-Termeer, *Die Haftung der Schiffer im griechischen und römischen Recht* (Zutphen, 1978); D. J. Thompson, 'Nile grain transport under the Ptolemies', in P. Garnsey, K. Hopkins and C. R. Whittaker (ed.), *Trade in the Ancient Economy* (Cambridge, 1983), 64–75. An earlier general account is M. Merzagora, 'La navigazione in Egitto nell'età Greco-romana', *Aegyptus* 10 (1929), 105–48. A recent study of the Ptolemaic period, with details of previous bibliography, can be found in H. Hauben, 'Les propriétaires de navires privés engagés dans le transport de blé d'état à l'époque ptolémaïque', *Akten des 21. Internationalen Papyrologenkongresses*, Berlin 1995 (Berlin, 1997), 430–48. In a future paper, I intend to present a study of river transport in Roman Egypt.

²⁷ Note the comments of P. Middleton, 'La Graufesenque: a question of marketing', *Atheneum* 58 (1980), 186–91, where he points out that an overland route from the region to Narbonne might have been preferred to the use of the River Garonne.

The Geography, Topography and Land Transport Networks of Egypt

The purpose of this chapter is to place transport in Roman Egypt into its physical context, and to examine how topography relates to our evidence, and how the physical archaeological evidence relates to the epigraphic and papyrological record. Geography and topography had a profound effect upon transport. The River Nile provided a great trading artery, but was, of course, much more than this. Herodotus described Egypt as the ‘gift of the Nile’.¹ Rising from the mountains of Ethiopia and Uganda, this river runs for 4000 miles and for almost half its length, through northern Sudan and Egypt, is joined by no tributary. Towards the end of its journey, the Nile spreads out like a fan into a large delta, with two main mouths at Rashid and Damyat. Near the mouth at Rashid lies Alexandria, the great cosmopolitan city, which thus straddles two worlds: the Mediterranean and the world of the Sahara. Egypt enjoyed a number of geographical advantages: ‘in natural strength and beauty of landscape [it] is reputed to excel in no small degree all other regions that have been formed into kingdoms’.² With the Mediterranean to the north and desert to the south, west and east, it was held to be easily defensible from outside attack.³

Diodorus Siculus considered the Delta to be like Sicily in shape. He goes on to say that ‘this island is intersected by many man-made

¹ Herodotus 2. 5.

² Diodorus Siculus 1. 30. 1.

³ Diodorus Siculus 1. 30; Tacitus, *Histories* 1. 11; Tacitus, *Annals* 2. 59; Strabo 17. 1. 21.

canals and includes the best land in Egypt'.⁴ His account does capture the importance of the Delta region, but this, unfortunately, is not reflected in the papyrological record, as we have seen. It was certainly densely populated and highly productive agriculturally.

The Delta lies at the head of a long and narrow river valley: at its widest point 20 km, at its narrowest, 1 km. Aelius Aristeides relates that toward Elephantine 'the mountains have closed so tightly together that there is nothing between them except the current itself, and the breadth of Egypt is the same as that of the river'.⁵ The valley runs from Aswan to modern Cairo, and defines the cultivable land of the country south of the great delta region. This plain was seasonally inundated, the flood waters reaching their peak in the south by the middle of August and in the north about six weeks later.⁶ About two-thirds of the valley was cultivable without additional irrigation or drainage, as the Nile flood left a thick deposit of nutrient-rich silt on the valley floor. Herodotus, discussing the Nile valley south of Memphis, relates that 'now, indeed, there are no men, neither in the rest of Egypt, nor in the whole world, who gain from the soil with so little labour; they have not the toil of breaking up the land with the plough, nor of hoeing, nor of any other work which other men do to get them a crop; the river rises of itself, waters the fields, and then sinks back again...'⁷

The productivity of the land could be improved through human effort. Irrigation not only increased the amount of cultivable land, but it had the additional benefit that it could be arranged in response to variable flood levels, retaining water after low floods and allowing the growing of a multiplicity of crops throughout the year. It is clear from the papyri that there was a constant concern for water

⁴ Diodorus Siculus 1. 34. 1.

⁵ Aelius Aristeides, *Or.* 36. 46 (trans. Bahr).

⁶ For the best introduction to the Nile flood, see K. W. Butzer, *Early Hydraulic Civilisation in Egypt: A Study in Cultural Ecology* (Chicago, 1976). On the centrality of the Nile to life in Egypt, see D. Bonneau, *La Crue du Nil, divinité égyptienne, à travers mille ans d'histoire* (Paris, 1964); ead., *Le Fisc et le Nil* (Paris, 1971) and *Le Régime administratif de l'eau du Nil dans l'Égypte grecque, romaine et byzantine* (Leiden, 1993). More generally, see O. Wikander (ed.), *Handbook of Ancient Water Technology* (Leiden, 2000).

⁷ Herodotus 2. 14 (trans. Marincola).

management, the main task being the maintenance of the dykes and irrigation channels which controlled flood waters.

The annual Nile flood, lasting from June to September, had a significant effect on patterns of transport. Although possible, river transport during the height of the flood was no doubt a hazardous undertaking.⁸ The transport of state grain was clearly organized around both the annual harvest and the flood, with the effect that there certainly was a concentration of grain transport by river in the period leading up to the flood. There was certainly a significant pressure from the state on those responsible for grain transport to ensure that transport took place at the appropriate time. A good example is *P. Oxy. XVIII 2182* of AD 165, in which Heliodorus, the *strategos* of the Themistos and Polemon divisions of the Arsinoite nome, writes to the royal scribe of the Oxyrhynchite nome urging him to send more transport animals to assist in the transport of grain in the Arsinoite, 'so that, while the river is still navigable, transportation may be carried out, as the water is already imperceptibly rising [?] and there is an urgent need that the corn be brought down quickly'.⁹ Transport downstream was possible, and was probably quicker at this time than other times of the year, but no upstream progress could have been made, 'since the force of the river overcomes every human device'.¹⁰

The pattern of transport dictated by the Nile flood upon river traffic clearly had an effect on land transport. Our evidence for the transport of grain by land shows that, although it took place throughout the year, transport was concentrated in the periods

⁸ On the hazards of travel in Egypt, see G. Nachtergaele, 'Un aspect de l'environnement en Égypte gréco-romaine: les dangers de la circulation', *Ludus Magistralis* 2 (1988), 19–54 and C. E. P. Adams '“There and back again”: getting around in Roman Egypt', in C. E. P. Adams and R. Laurence (ed.), *Travel and Geography in the Roman Empire* (London and New York, 2001), 138–66. See *P. Oxy. LIX 4003* (fourth or fifth century) and 4004 (fifth century) for river transport affected by the flood.

⁹ *P. Oxy. XVIII 2182* (AD 165) (*BL Konkordanz* 153; on the date *BL VIII 254*). The verb used is *ὑπονοστῆω* which normally has the meaning 'to retire' (H. C. Youtie, 'Oxyrhynchus Papyrus 2182', *Classical Weekly* 37 (1944), 163–5 = *Scriptiunculae* ii 869–72), with *ὑπο-* acting as a 'minimizing' prefix. The text may therefore mean 'as the water is imperceptibly falling'. At any rate, it is clear that the level of the river is of concern to Heliodorus, and here he is probably exaggerating the situation to achieve his end.

¹⁰ Diodorus Siculus 1. 33. 1.

immediately after the harvest and before the flood. The urgency of this process is well illustrated by a fragmentary text from the Arsinoite nome dating to the first century BC, in which an official in charge of loading ships writes to a collector of grain taxes instructing him not to send any more grain, as there is not enough storage space, and the porters are having to work night and day to fill the ships.¹¹

There is some evidence that overland transport too may have been affected directly by the flood. Certainly irrigation channels will have been swollen to capacity, and many routes over cultivated land will have been barred due to inundation of the fields. Herodotus describes the Nile in flood as follows: ‘when the Nile overflows the land, the towns alone are seen above the water, very like the islands in the Aegean sea. These alone stand out, the rest of Egypt being a sheet of water.’¹² Roads could be rendered impassable. In one private letter from Oxyrhynchos, a woman named Arsinoe writes to Sarapis and refers to the roads not yet being firm, possibly due to the inundation.¹³ A papyrus from the archive of Zenon shows that transport animals were unable to travel between the village of Nechthenibis in the Saite nome and Hermopolis Parva in the Delta region, as the flood had covered their roads.¹⁴ The effect of the flood and irrigation on land transport was clearly significant.¹⁵ Certainly it has also had an effect on the preservation of archaeological evidence for roads, as we shall see.

Other factors—civil disturbance, or brigandage—could render roads impassable. A late third-century-AD letter exchanged between two business associates records that they had ‘been advised by the most notable Ammonion to send for a ferry-boat on account of the uncertainty of the road.’¹⁶ In a private letter from the fourth or fifth

¹¹ SB XIV 11371.

¹² Herodotus 2. 97; compare Strabo 17. 1. 5.

¹³ *P. Oxy.* XXXIII 2680 (second/third century).

¹⁴ *P. Mich. Zenon* 103, col. 1, 2–8 (first half of third century BC). The use of the verb *καταγωγείν* in l. 6 must indicate the caravan’s intention to travel north, ‘down to’ the Delta, and thus Hermopolis Parva is the probable destination.

¹⁵ The effects of irrigation channels on transport are briefly discussed by R. S. Bagnall, ‘The camel, the wagon, and the donkey in later Roman Egypt’, *BASP* 22 (1985), 1–6.

¹⁶ *P. Oxy.* I 118 verso (late third century).

century AD exchanged between two men possibly involved in the running of a large estate, the writer instructs the recipient to 'send wood, for the road is clear'.¹⁷ The lack of context in many private letters does not always allow for a perfect reconstruction of circumstances, but we can be clear that the state of roads was of concern to travellers.

The River Nile clearly provided the most convenient transport in Egypt; the ease with which northbound downriver travel was made was to some extent matched by the prevailing northerly winds that facilitated upriver sailing. There is, however, comparatively meagre evidence for river travel in Egypt against land transport, which must be an accident in the preservation of our evidence.¹⁸ We know that there were designated anchorages, and owing to the difficulties of night-time navigation there were commonly stipulations in shipping contracts that ships would anchor at night at safe harbours.¹⁹ That there were regular stopping points for travellers is suggested by an itinerary of a journey preserved on a papyrus from Oxyrhynchos, almost certainly made by river as the travellers stopped at points on both banks of the Nile.²⁰ The text raises another important aspect of travel in Egypt, the use of canals. In the Delta, canals linked branches of the Nile. In the Oxyrhynchite itinerary, the travellers probably sailed from Nicopolis to Schedia by canal, where they would have joined the Canopic branch of the Nile; this would have taken them past Hermopolis Minor, eventually leading to Babylon and Memphis.²¹ Clearly it would have been possible at this point to sail south on the Nile to Oxyrhynchos, but the travellers seem to have taken the Nile as far as Aphrodito, where they joined the Fayum Canal and then the Bahr Yusuf, on which, with various stops at the Fayum port of Ptolemais Hormou, Kaine and Tacona, they would eventually have reached Oxyrhynchos.²² Although there is every

¹⁷ *P. Haun.* II 19 (fourth or fifth century).

¹⁸ See Adams, 'There and back again', 146–7.

¹⁹ *P. Ross. Georg.* II 18 (AD 140). In the Ptolemaic period there seems to have been a royal ordinance forbidding river travel at night, see *P. Hib.* II 198, ll. 110–22 (mid-third century BC), with R. S. Bagnall, 'Notes on *P. Hib.* II 198', *BASP* 6 (1969), 73–118.

²⁰ *P. Oxy.* XLII 3052 (first century).

²¹ On the canal at Schedia, see Strabo 17. 1. 16, who mentions the presence of a customs station.

²² On the Fayum canal, see Strabo 17. 1. 35 and 37.

indication that in this case the travellers were in no hurry, one effective way of cutting the length of time it took to sail upriver was to use these major canals, where the stream would have been less strong. There is no doubt that at a local level travel by canal was important. At any rate, it is important to note that there was often a choice of how to travel, as there was, in addition to river and canal, a network of roads.²³

Major roads ran the full length of Egypt, from the Mediterranean coast to Syene. Any trace of them has been entirely lost due to the annual flood and changes in the course of the Nile over time. Curiously, milestones are almost entirely absent from Egypt, and despite traces, they remain a ghost. This raises a perplexing problem. We can easily explain the lack of milestones from the Nile Valley, but cannot do so for the well-attested routes in the Eastern Desert. As we shall see, distances in the desert were marked by cairns, and this presents the distinct possibility that milestones, as found in other provinces, were not widely used. Instead, either cairns or marker stones were spaced at intervals along desert routes, and it is likely, although evidence is certainly not conclusive, that they may have had inscriptions.²⁴ Strabo mentions marker-stones on the road from Syene to Philae, which must predate the Roman period, and may even be pharaonic.²⁵ For the Roman period, only two milestones survive from Nubia, one of Trajanic date, the other tetrarchic. The first records the distance from its location to Philae (32 miles, and therefore probably relating to Talmis), the second is unclear but is interesting in the context of Diocletian's activity in the Dodecaschoenus.²⁶ Only one milestone survives elsewhere in Egypt. It is Constantinian in date, and relates to a road connecting Babylon with Clysma, via Heroonopolis.²⁷

²³ See e.g. *P. Oxy.* I 112 (third or fourth century).

²⁴ For milestones in the Western Desert, see M. S. Drower, *Flinders Petrie: A Life in Archaeology* (London, 1985) 123. Presumably these are now lost. For possible milestones in Nubia, see J. J. Hester, P. M. Hobler, and J. Russell, 'New evidence of early roads in Nubia', *AJA* 74 (1970), 385–9, who discuss the nature of the road and the discovery of cylindrical marker stones on which faint traces of letters are visible on their badly eroded surface.

²⁵ Strabo 17. 1. 50.

²⁶ *CIL* III Suppl. 14148² and 14148³.

²⁷ *CIL* III 6633.

While it is certainly the case that our archaeological evidence for roads and milestones, at least in the Nile Valley, is poor, the relation between our best evidence for these roads, the Antonine Itinerary and the Peutinger map, and to a lesser extent the derivative Ravenna Cosmography, and the papyrological evidence is only a little better.²⁸ There is a very small body of documents which allows of some comparison, but it seems best to begin with the itinerary tradition. The Antonine Itinerary lists the names of stations that lay along roads connecting communities: none of the stations remain, and many of the locations mentioned have not been identified on the ground.²⁹ Roads lay along the Mediterranean coast from Catabathmus to Caportis and from Râfa to Pelusium. Pelusium was connected to Alexandria by a road running through Tanis and Cynopolis, and to Memphis via Scenas Veteranorum. A route from Alexandria to Memphis travelled through Hermopolis Parva (but it is likely that another route connected the Fayum to Alexandria through the desert). Babylon was connected to Clysmia via Heroonopolis and Serapeum, and this route branched off to Pelusium on the Mediterranean coast via Magdolum. In the Nile Valley, on the west bank of the river, a route connected Memphis to Contra-Syene, and, on the east bank, Babylon to Syene. South of Syene, the road continued on both banks to Hierasykaminos, the most southerly point of Egypt.³⁰ Finally, a road linked Koptos to the port of Berenike on the Red Sea coast.

²⁸ There is a growing literature on itineraries: see most recently K. Brodersen, *Terra Cognita: Studien zur römischen Raumerfassung*. Spudasmata Bd, 59 (Zurich, 1995); B. Salway, 'Travel, *itineraria* and *tabellaria*', in Adams and Laurence, *Travel and Geography*, 22–66; id., 'Sea and river travel in the Roman itinerary literature', in R. Talbert and K. Brodersen (ed.), *Space in the Roman World: Its Perception and Presentation* (Münster, 2004), 43–96; R. Talbert, 'Cartography and taste in Peutinger's Roman map', in Talbert and Brodersen, *Space*, 113–41; K. Brodersen, 'Die Tabula Peutingeriana: Gehalt und Gestalt einer "alten Karte" und ihrer antiken Vorlagen', in D. Unverhau (ed.), *Geschichtsdeutung auf alten Karten: Archäologie und Geschichte* (Wiesbaden, 2003), 289–97. For the Ravenna Cosmography, see L. Dillmann, *La Cosmographie du Ravenne* (Brussels, 1997). On Egypt specifically, see J. Ball, *Egypt in the Classical Geographers* (Cairo, 1942), 138–58.

²⁹ The classic text, O. Cuntz (ed.), *Itineraria Romana*, i: *Itineraria Antonini Augusti et Burdigalense* (Leipzig, 1929), has been updated by G. Wirth (Stuttgart, 1990).

³⁰ The route from Rome to Hierasykaminos is thought to represent the basis of the whole itinerary; see Salway, 'Travel, *itineraria* and *tabellaria*', 40.

The Peutinger map is less informative. Roads are marked as a red line, and join Alexandria with Catabathmus and Rhinocolura with Pelusium and eventually Memphis. No route links Alexandria with the Nile Valley. Routes in the Delta link Pelusium with Hermopolis Parva and Melcati with Memphis, via Naukratis. A route from Memphis travels the west bank of the Nile as far as Koptos, from where two routes continue, first on the east bank of the Nile to Hierasykaminos and second to Berenike. The distances often vary from those recorded in the Antonine Itinerary, and often the names of stations are omitted.³¹

There is very little evidence for these routes in the papyri, but we do have two documents from Oxyrhynchos, dating to the fourth century AD, which preserve accounts for the station (*mansio*) at Tacona near Oxyrhynchos and the city of Oxyrhynchos itself, principal stopping points on the route from Memphis to Contra-Syene on the west-bank road.³² The accounts, while interesting as evidence for the organization of supply for *mansiones*, tells us little more about the route it served than the fact that a station existed at Tacona. Similarly, the first of two extremely long and important papyri from Panopolis reveals information only on the supply of bedding to two *mansiones* at Psonis and Psinabla in the Panopolite nome, which lay on the road on the east bank of the river.³³ What seems clear in a surviving itinerary of a journey preserved on a papyrus from Oxyrhynchos, discussed further below, is that the river could easily be used for travel, and stops could be made at the main *metropoleis* along the route (which might have an associated *mansio*). This raises the issue of whether it was more common to use the river rather than roads. What the Oxyrhynchite *mansio* accounts do prove is that roads were used, for one of the main commodities supplied was fodder for animals. Further, a document from Oxyrhynchos preserving the details of animals requisitioned for transport, discussed further below, mentioned that they are to be

³¹ For a more detailed discussion and comparison of distances, see Ball, *Egypt in the Classical Geographers*, 138–60.

³² *P. Oxy.* LX 4087–8 (fourth century). On the stations of the *cursus publicus*, see A. Kolb, *Transport und Nachrichtentransfer im Römischen Reich* (Berlin, 2000), 210–13.

³³ *P. Panop. Beatty* 1 (AD 298) ll. 262–3.

used as far as Memphis, clearly on the road on the west bank.³⁴ Further still, in a number of documents preserved among the Leipzig papyri, dating to the late fourth century AD, details have survived of a journey made by officials who travelled south on one bank of the river, and north on the other.³⁵

Local roads and tracks would almost certainly have run alongside irrigation channels, or perhaps along the top of dykes, as is the case with rough tracks on agricultural land in modern Egypt.³⁶ Soil excavated from such channels was deposited on each side of or on top of the dyke, in effect forming an embankment that served as a road. Roads, however, are infrequently attested on papyri, apart from land survey documents and sales of property. They are not mentioned with any consistency in these texts, suggesting that tracks did indeed run along the top or sides of dykes.³⁷ When mentioned, they are usually identified by their position with respect to the land being surveyed or sold—north road (βορρᾶ ὁδός), east road (ἀπηνλιώτου ὁδός), or perhaps a description such as ‘the river by the stream’ (for example λιβάς ὁδός). There is no evidence that such roads were normally paved, but with use by traffic these rough tracks became compressed and, as they were raised slightly above the surrounding arable land, they were good underfoot and easily recognizable as roads. In one case a road is specifically stated to be flat (πεδιακῆ ὁδός).³⁸

Occasionally roads mentioned in land surveys or property sales are described as being a ‘public road’ (ὁδός δημοσία), or a ‘royal road’ (ὁδός βασιλική).³⁹ As our evidence for roads generally is not good,

³⁴ *P. Oxy.* XXXI 2577 (third or fourth century).

³⁵ B. Kramer, ‘Zwei Leipziger Papyri’, *Archiv für Papyrusforschung* 32 (1986), 33–5, cited by J. D. Thomas, ‘Communication between the prefect of Egypt, the procurators and the nome officials’, in W. Eck (ed.), *Lokale Autonomie und römische Ordnungsmacht in den kaiserzeitlichen Provinzen vom 1. bis 3. Jahrhundert* (Oldenbourg, 1999), 95.

³⁶ D. Crawford, *Kerkeosiris: An Egyptian Village in the Ptolemaic Period* (Cambridge, 1971), 73.

³⁷ Occasionally, however, a plot of land could be described as being beside a road. For a reconstruction of a land use pattern for Tebtunis in the second century BC, including paths, see Crawford, *Kerkeosiris*, 160–2.

³⁸ *BGU* XI 2055 (second century).

³⁹ For ‘public roads’, see *P. Mich.* V 272 (AD 45–6); *SB* I 5168, for a public road by a stream, λιβάς ὁδός δημοσία (l. 27); *SB* XII 10892 (AD 188). For ‘royal roads’, see *PSI* VIII 917 (first century); *SB* VI 9109 (AD 31); *P. Mich.* V 262 (AD 35–6); V 282 (first century); and *SB* VI 9193 (reign of Justinian). For the imprecision in the use of

indeed they represent mere incidental detail in our documents, it is not entirely clear what these terms mean. There are two possibilities. First, that some roads were public property and others were owned by the state. Second, that no roads were privately owned but all were maintained by the state (a cost which ultimately fell on the province anyway, or in the case of roads in cities, on the *metropoleis* themselves), but that those running through public land were owned by the emperor and fell under his *patrimonium*.⁴⁰

A number of problems were inherent with such a road network. First, these roads did not lend themselves to heavy transport by wheeled vehicles: they were very much more suitable for pack animals. One dominant feature of transport in Egypt, which is determined by a number of factors of which topography is central, is the dominance of pack animals. Second, the annual flood would have made paved roads very difficult to maintain; annual repairs would have been a costly and time-consuming business. Rough tracks were not immune to this damage, but potholes and other hazards could easily be repaired. It is likely that road repair was considered to be part of the duties of those men involved in the annual repair of irrigation works—a long-standing liturgical service. Third, many bridges would be needed to cross irrigation channels. There is, however, little mention of bridge construction or repair in the papyrological record. Although timber was a rare commodity in Egypt, it is possible that bridges were constructed from palm wood, which could easily have borne the weight of men and animals. Simple wooden platforms may have been used to cross narrow channels, much as is the case in Egypt today. It is possible also that stone was used. A small number of ostraca from the third century AD mention a liturgy known as the *κυλλιθηγγία*, which seems to have been the transport of stone connected with corvée work on irrigation works.⁴¹ Youtie suggested that ‘men could be detached from the

these terms with respect to land, see L. Capponi, *Augustan Egypt: The Creation of a Roman Province* (London and New York, 2005), 98.

⁴⁰ For a similar situation in Asia Minor, see S. Mitchell, ‘Requisitioned transport in the Roman empire’, *JRS* 66 (1976), 106–31; also, *SEG* XVI 754, with W. H. C. Frend, ‘A third-century inscription relating to Angareia in Phrygia’, *JRS* 46 (1956), 46–56. See Kolb, *Transport und Nachrichtentransfer*, 50–2.

⁴¹ *SB* XIV 11441–2. See Bonneau, *Le Régime administratif*, 166–7.

corvée and assigned to boats transporting stone needed to strengthen the walls and beds of canals, especially where the construction of special irrigation works like dams and weirs was being undertaken.⁴² We can safely assume that in some instances, stone was used to strengthen small bridges crossing irrigation channels.⁴³ Larger channels would, as we have seen, been followed by roadways, where crossings could no doubt have been effected at some point. Beyond this speculation, we can say little, except that, as we shall see, the pack animal was the most important medium of transport and required little more than rough trackways to walk upon.

The Fayum depression should be included in our discussion of the Nile Valley and Delta. It received water from the Nile by way of a canal called the Bahr Yusuf, and had as another source Lake Moeris, which lay to the west side of the depression. The Fayum essentially formed the Arsinoite nome, which was described by Strabo as 'the most noteworthy of all in respect of its appearance, its fertility and its resources'.⁴⁴ The region was renowned in antiquity for a number of reasons. It was the site of the famous Labyrinth, mentioned by many ancient authors.⁴⁵ Indeed, Tacitus records that Germanicus, when visiting Egypt, was particularly interested in visiting the Fayum to see its irrigation works, which no doubt he knew had been significantly restored by Augustus after the annexation of the province.⁴⁶

We have already noted that irrigation had a profound effect upon land transport. But the Fayum posed an additional problem to transport. As we have seen, much of the Nile Valley is not more than a few kilometres wide, with the result that goods did not have to be transported far by land to the nearest river ports. The Fayum, however, lies further from the Nile, its most distant points as much as

⁴² H. C. Youtie, 'Notes on O. Mich. I', *TAPA* 71 (1940), 633–4 = *Scriptiunculae* i 73.

⁴³ During repair, bridges may have been closed. See *P. Tebt.* III 753 (197 or 172 BC), a letter from one Herodorus to Adamas, in which he records that 'when we had carried the wheat from Ibion we found the bridge closed and returned to Oxyrhyncha'.

⁴⁴ Strabo 17. 1. 35.

⁴⁵ Most notably by Herodotus 2. 148. For discussion see K. Armayor, *Herodotus' Autopsy of the Fayoum: Lake Moeris and the Labyrinth of Egypt* (Amsterdam, 1985), *passim*.

⁴⁶ On Germanicus, see Tacitus, *Annals* 2. 61; on Augustus' refurbishment of the irrigation system of Egypt, after its deterioration in the late Ptolemaic period, see Strabo 17. 1. 3, though there is, no doubt, an element of propaganda in this context.

100 km away. There were many navigable canals, on which barges could be used to transport produce from small harbours in the Fayum to the larger harbours and ships on the Nile itself. But often even these streams could lie a considerable distance away for those wanting to transport their grain or other goods. This is well illustrated by a text from Tebtunis dating to the late second century BC:

At Kerkeosiris, which is unguarded and is not placed on the Great River or any other navigable stream, and is 160 stades distant from Ptolemais Euergetes the metropolis of the nome and 159 stades from Moeris, near which there is a guarded point, the corn collected is taken to the royal granary in the village, an additional payment of 3 artabas on every 100 being made for cleaning and sifting and one of 2 artabas on every 100 for extra measure.⁴⁷

From this text it is clear that transport by pack animal was the only feasible way in which grain could be transported to harbours, and that such transport was obviously of concern to the central government, which was keenly aware of the problems posed by land transport. It is also important to note from the second fragment of the papyrus quoted above that grain was transported to harbours in the Heracleopolite nome, which, although lying in a different nome (and therefore a different administrative unit), were closer than harbours in the Fayum.⁴⁸

Given that the Nile Valley, the Fayum, and the Delta region were so highly irrigated and laced with canals and other water channels, and that the pattern of the road network was dictated accordingly, it is not surprising that the pack animal was the main medium of transport. This, however, was certainly not a phenomenon restricted to Egypt, for generally in the Mediterranean basin, harsh and changeable relief secured for pack animals a monopoly on transport.⁴⁹ Wheeled

⁴⁷ *P. Tebt.* I 92 (late second century BC) (trans. Hunt). In a fragment of a copy of the same text, *P. Tebt.* IV 1102, an additional line is preserved: 'it is transported from there by pack-animals to . . . in the Heracleopolite [nome] . . . to Alexandria . . . , 8 artabas on every 100 for . . . the village . . .' For discussion, see M. Rostovtzeff, 'Angariae', *Klio* 6 (1906), 209, and Crawford, *Kerkeosiris*, 128.

⁴⁸ Transport operations often involved cross-nome organization, which point will be developed more fully below.

⁴⁹ A point stressed by J. Sion, 'Quelques problèmes de transports dans l'antiquité: le point de vue d'un géographe méditerranéen', *Annales d'histoire économique et sociale* 6 (1935), 628–33, a review of C. Lefebvre des Noëttes, *L'Attelage: Le Cheval de selle à travers les âges: Contribution à l'histoire de l'esclavage* (Paris, 1931).

transport, although certainly important in various agricultural tasks, could only compete when suitable road networks existed:

Techniques of transport are closely interdependent: 'the pack-saddle competes with the harness, bovine with equine traction. River and coastline transport and human portage restrict the role of animals. In proportion as a particular technique is better adapted to geographic conditions and is able to move goods at a lower price, it pushes other methods into the background.'⁵⁰

The same is true for transport in the desert, to which regions we now turn. The Western and Eastern Deserts are each barely habitable, relieved only by occasional springs forming oases in the Western Desert or high water tables in the Eastern Desert allowing water to be drawn. Indeed, Strabo noted that the Egyptians called these springs 'oases' and that these were 'the inhabited districts which are surrounded by large deserts, like islands in the open sea'.⁵¹ Egypt, like the Tigris and Euphrates valleys, enjoyed distinct advantages in the navigability of the Nile, but as Braudel puts it, 'natural advantages did not dictate everything, and in any case the crossing of these desert lands was always to be an obstacle, overcome only by great effort'. He states elsewhere that 'on going from the Mediterranean to the Sahara all the distances grow longer, the scales change completely. The supreme importance of transport is increased and comes to dominate everything else.'⁵²

The oases may have been islands in the desert, but they were not self-sufficient and relied on the Nile Valley for provisions. They may have been habitable and fertile, but the routes leading to them were dangerous and crude.⁵³ Trade and transport between the valley and the oases will be studied in detail below, but it is necessary to consider here the routes in the desert regions.

In the Western Desert, three main areas were connected to the Nile Valley or Fayum: the Great Oasis (really a group of oases), the Small

⁵⁰ K. D. White, *Farm Equipment of the Roman World* (Cambridge, 1975), 219, citing P. Vigneron, *Le cheval dans l'antiquité gréco-romaine* i (Nancy, 1968), 140.

⁵¹ Strabo 17. 1. 5. For a comprehensive survey of ancient literature, see G. Wagner, *Les Oasis d'Égypte à l'époque grecque, romaine et byzantine d'après les documents grecs (Recherches de pyrologie et d'épigraphie grecques)* (Cairo, 1987), 113–20.

⁵² Braudel, *The Mediterranean and the Mediterranean World*, 184 and 173.

⁵³ Wagner, *Les Oasis*, 117.

Oasis, and the Oasis of Ammon at Siwa. The Great Oasis was a large and fertile area, with an equally large and diverse population. Its two main regions, Kysis and Hibis, were connected to a large number of *metropoleis* in the valley.⁵⁴ Routes extended to the oasis from Apollonopolis Magna (Edfu), Latopolis, Asphynis, Hermonthis,⁵⁵ Syene, Diospolis, Tentyra,⁵⁶ Abydos,⁵⁷ Lycopolis, Toeto,⁵⁸ and Panopolis. The existence of routes was necessary not only for the supply of essential foodstuffs to the population, but also for the provisioning of the military garrison, well-attested by papyri and ostraca (principally from Kysis (Douch)). Military needs were certainly a stimulus to transport and trade, as we shall see below. The word *óδοc* is used for these roads, which is shown clearly by one papyrus, a list of guards which records their presence on the route from Panopolis to the Oasis (*ὀρεοφύλακες ὁδοῦ Ὁασειωc*).⁵⁹ The other designation for desert route, *τὸ ἴχνος*, which has the meaning of 'track' or 'trail', does not seem to be used for the routes connecting the Nile Valley with the Great Oasis or for those connecting the different sub-divisions of the Great Oasis.

It is certain that roads connected the different parts of the Great Oasis, Khargeh and Dakhla, as the distance to be covered was considerable—perhaps up to 350 km, though it could be cut to 200 km if a more direct route across the desert was taken. One papyrus preserves a contract drawn up between a woman living in Mothis in the Dakhla Oasis and an individual from Kysis, and thus proves contact between the two regions.⁶⁰

⁵⁴ See Wagner, *Les Oasis*, 141–6. See also P. J. Parsons, 'The wells of Hibis', *JEA* 57 (1971), 165–80. There is a growing literature on the Great Oasis, especially Kellis; see most recently in O. Kaper (ed.), *Life on the Fringe: Living in the Southern Egyptian Deserts during the Roman and Early-Byzantine Periods* (Leiden, 1998).

⁵⁵ Routes to the Oasis from these four cities are discussed by Wagner. He claims that, as the ostraca from Douch mention soldiers from these cities based at Kysis, routes must have come from there. Such routes may have joined at some point in the desert before reaching the Oasis; we should not assume that there was a direct route from each.

⁵⁶ *P. Grenf.* II 74 (AD 302), a contract for the sale of a camel between inhabitants of Kysis and Tentyra.

⁵⁷ Strabo 17. 1. 42. See also *SB* IV 7403 (239/8 BC).

⁵⁸ *P. Grenf.* II 77 (third or fourth century), a letter concerning the transport of a mummy.

⁵⁹ *SB* I 4636 = *P. Achm.* 7 (third century).

⁶⁰ *P. Grenf.* II 75 (AD 308) (*BL* I, 191).

The Small Oasis lies to the north of the Great, but is situated closer to the Nile Valley. Four principal routes connected it to other parts of Egypt. Routes to the east and north-east led to the Oxyrhynchite and Arsinoite nomes, and to the south and west lay the Dahkla Oasis and the Oasis of Ammon at Siwa. Arguably the most important route was that which led to Oxyrhynchos, which is understandable given that it is the shortest distance to the valley and that the Small Oasis was linked administratively to the Oxyrhynchite nome.⁶¹ Fortunately, there is a small body of papyrological evidence attesting contact along this route.

At Oxyrhynchos it seems that the roads into the desert to the Small Oasis were deemed important enough to have a city gate, through which caravans passed, named the *πύλη Λιβικῆ*,⁶² and from a custom-house receipt from Oxyrhynchos we see that customs dues were paid on going through a gate for the oasis (*διὰ πύλιον Ὀάσεως*), which is probably identical.⁶³ It is, however, from a group of late-second-century AD letters that we have our best evidence for trade and transport between Oxyrhynchos and the Small Oasis. We will be considering these in greater depth below, but we should note a number of points here. The first is that regular contact is certainly implied, as a group of business partners seem to have long-standing arrangements. Second, and more importantly at this stage, there are links between Oxyrhynchos, the Small Oasis and Siwa, where one of the partners is based.⁶⁴ Siwa was certainly connected to Memphis in the Nile Valley. Both were ancient centres of great religious importance, and it seems that a route existed between them from the time of Psammeticus I.⁶⁵ There was also a route from the Small Oasis to Paraetionium on the Mediterranean coast, in addition to the route between there and the Oasis of Ammon at Siwa recorded by Arrian.⁶⁶

The Small Oasis was connected to the Arsinoite nome by several routes. The word used to describe the route is different: *ἕλνος* instead

⁶¹ See *P. Oxy.* II 485 (AD 178), and commentary to *P. Oxy.* XII 1439 (AD 75).

⁶² *P. Oxy.* I 43 = *W. Chr.* 474, with *BL* II 27.

⁶³ *P. Oxy.* XII 1439 (AD 70) = *P. Customs* 8 (dated incorrectly in the *editio princeps* to AD 75). Such receipts are rare from Oxyrhynchos in comparison to the Fayum.

⁶⁴ *P. Oxy.* XLI 2975 and 2983 (late third century).

⁶⁵ On Memphis in the Ptolemaic period see D. J. Crawford, J. Quaegebeur, and W. Clarysse, *Studies on Ptolemaic Memphis*, *Studia Hellenistica* 24 (Leuven, 1980) and D. Thompson, *Memphis under the Ptolemies* (Princeton, 1988).

⁶⁶ Wagner, *Les Oasis*, 150–1; *P. Oxy.* III 653 and *P. Oxy.* IX 1221; Arrian 3. 3. 3–5.

of ὁδός.⁶⁷ Thirty-three customs-house receipts from the Arsinoite nome record taxes being paid for the protection of desert routes, and the difference in route terminology is clear—ἔχνοῦς ἐρημοφυλακίας.⁶⁸ Desert routes left the Arsinoite nome from Bakkhias, Karanis, Dionysias, Tebtunis and Philadelphia, but the principal station for desert travel was undoubtedly Soknopaiou Nesos, mentioned more than any other in connection with desert transport.⁶⁹ We shall consider this important and in many ways unique village in more detail below. It lay on the north-west boundary of the Arsinoite nome on the shores of Lake Moeris. Thus it was positioned at the terminus of several important desert routes, and so naturally became a centre for transport. Routes from this village led to the Small Oasis, to Siwa, and north to Alexandria and the nomes of the Delta. The existence of a desert route between the Fayum and Alexandria is also likely. Sijpesteijn holds that an important desert route existed between the Fayum and Alexandria, beginning at Soknopaiou Nesos.⁷⁰ Milestones, it seems, were found by Flinders Petrie, and evidence from camel sales suggests that markets existed between the Fayum and Alexandria, which certainly indicates the existence of a connecting land-route.⁷¹ If we consider the economics of transport, it may have been cheaper to transport items by land from Soknopaiou Nesos to Alexandria, in order to avoid having to travel extra distance to the harbour at Memphis (or perhaps Ptolemais Hormou) and incurring lading charges at the port. Overall, in certain circumstances there may have been little saving in time or expense in transporting goods by river rather than land.⁷²

⁶⁷ See *P. Ryl.* II 197 (second century) for an example of the use of ἔχνοῦς.

⁶⁸ *P. Customs* pp. 21–2.

⁶⁹ Soknopaiou Nesos is the station recorded on 42 out of 69 receipts (61%). Philadelphia is recorded on 10 receipts (14%).

⁷⁰ *P. Customs* p. 45.

⁷¹ For milestones, see Drower, *Flinders Petrie*, 123; on animal sales, see A. Jördens, ‘Sozialstrukturen im Arbeitstierhandel des kaiserlichen Ägypten’, *Tyche* 10 (1995), 63, for camel sales made at Terenuthis in the Prosopite nome, suggesting a trading link. Another sale is made at Mareotis. It is extremely unlikely that animals were transported to these areas by river, so it is certain that there was a desert route.

⁷² For similar arguments with regard to Roman Italy, see Laurence, *Roads of Roman Italy*, 129–48. See C. E. P. Adams and N. Gonis, ‘Two customs-house receipts from the Bodleian Library’, *ZPE* 126 (1999), 214.

Caravans travelling to the desert from the Nile Valley at Memphis, and from villages lying in the north of the Arsinoite nome, would travel through Soknopaiou Nesos, rather than traverse the highly irrigated terrain of the Fayum itself. The other villages of the nome were connected by routes to these important stations, and to the Nile Valley, by other routes crossing a small section of desert in a direct line to the valley. There is some evidence for a trans-desert route connecting the Fayum to the Nile Valley around Memphis, a route that seems to have been protected by a wall and guard towers.⁷³ To the south of the Arsinoite, routes left Tebtunis and ran for a short distance through the desert to the Heracleopolite and Oxyrhynchite nomes.

To the east of the Nile lay the Eastern Desert and the Red Sea. This desert is different in character to the Western Desert, being mountainous and devoid of oases. Unlike its counterpart, however, it was rich in natural resources—building and decorative stone (such as porphyry), precious minerals and ores—and also provided access, albeit difficult, to the Red Sea. The Eastern Desert has been the focus of archaeological survey and excavation, and is therefore better known than other desert regions of Egypt. Its importance to the Roman economy may be reflected, however, not only in the concentration of ancient sites and desert routes, but also in the interest in the region of ancient writers.

A number of desert routes connected different parts of Egypt to the Red Sea. Pliny the Elder notes that three routes connected the Gulf of Suez, at the northern most point of the Red Sea coast in Egypt, to the Nile Valley and Delta.⁷⁴ The first ran from Pelusium on the Mediterranean coast to Arsinoe at the Gulf of Suez. Pliny records that this road traversed sandy desert and was marked, not by a road, but by a line of reeds fixed in the sand. The second and third ran from Mount Casius and Gerrum respectively, the road from Gerrum through mountainous terrain devoid of watering-places. Although Pliny writes that journeys between Egypt and the Red Sea were constantly made by land, he mentions a navigable canal built from

⁷³ A. Rowe, 'A contribution to the archaeology of the Western Desert: III', *Bulletin of the John Rylands Library* 38 (1955–6), 139–65, esp. 162–5.

⁷⁴ Pliny, *NH* 6. 33. 165.

the Nile to the Gulf of Suez, near Heroopolis. The canal was possibly first excavated during the reign of the Pharaoh Sesostris, later repaired by the Persian Darius, and by Ptolemy I and lastly Ptolemy II (although there is no hard evidence for this) who seems to have abandoned the project before completion due to, as Pliny records, fear of flood or of polluting the waters of the Nile. Strabo notes that the canal was deep enough to cope with the draft of large merchant vessels.⁷⁵

This canal later became known as Trajan's Canal or Trajan's River. There is a certain amount of papyrological evidence for this canal, and although most dates to the late third century AD and after, we can be fairly confident that it was re-excavated under Trajan, who seems generally to have made improvements to the irrigation systems of Egypt and changes to the system of administration.⁷⁶ The purpose of the canal is not clear. Letronne argued that it was important to the exploitation of stone from the Eastern Desert, justifying his position by noting the particular importance enjoyed by both Mons Claudianus and Mons Porphyrites during the reign of Trajan.⁷⁷ He thus supposed that stone was transported to the Red Sea, shipped to Clysma and taken via Trajan's Canal to the Nile. This is unlikely, as there is no evidence for stone being transported to the Red Sea from the quarries; rather, all evidence points towards its transport to Qeneh. The other possibility is that it was built to facilitate trade, but the difficulty of navigating up to Clysma on the Red Sea may have discouraged ships from travelling north of Myos Hormos.⁷⁸ The use

⁷⁵ Pliny, *NH* 6. 29; Strabo 17. 1. 26. There is some debate about the existence of a Nile–Red Sea canal as early as the Middle Kingdom, which perhaps can be linked to Sesostris: see A. M. A. H. Sayed, 'On the non-existence of the Nile–Red Sea canal (so-called canal of Sesostris) during the Pharaonic times', in id. (ed.), *The Red Sea and its Hinterland in Antiquity: A Collection of Papers Published in the Arabic and European Periodicals* (Alexandria, 1993), 127–47. On the later period, see P. Paice, 'The Punt Relief, the Pithom Stele, and the Periplus of the Erythraean Sea', in A. Harrak (ed.), *Contacts between Cultures: West Asia and North Africa* (Lewiston, 1992), 227–35.

⁷⁶ For discussion, see P. J. Sijpesteijn, 'Trajan and Egypt' in *P. Lugd. Bat.* XII, pp. 70–83.

⁷⁷ J. A. Letronne, *Recueil des inscriptions grecques et latines de l'Égypte* i (Paris, 1842), 189–99.

⁷⁸ S. E. Sidebotham, 'Ports of the Red Sea and the Arabia–India trade', in V. Begley and R. D. De Puma (ed.), *Rome and India: The Ancient Sea Trade* (Madison, Wisc., 1991), 16–17, suggests that bulk agricultural commodities may have been transported.

of desert routes from the ports of the Red Sea to Koptos is well attested, and it seems more than likely that these were the focus of trade, rather than Clysma.⁷⁹ The final possibility is some connection with the Roman Red Sea fleet, but the existence of this fleet, or at least its nature, is debatable. Eutropius notes that ships were transferred from the Mediterranean to the Red Sea on this canal for Trajan's campaign against the Parthians.⁸⁰ We know little else.

It is clear that the canal remained open, if not permanently, at least during various periods. We know that appointments to the liturgy of clearing the canal were made, and officials called *epimeletai* (or overseers) were in charge of its maintenance.⁸¹ It was still being used for the purposes of supplying a fleet in the eighth century, as is confirmed by a group of papyri from the British Museum which concern working on the canal, building a number of ships to supply workers at Clysma, and an order for supplies for ships based there.⁸² We should conclude that Trajan's Canal was not a regular transport route. It may have only been open during the Nile flood, and was probably only used for specific and usually military purposes.

Before briefly considering the desert routes in the region between the Nile Valley and the Red Sea coast, the location of settlements on this coast must be considered. Both Strabo and Pliny note that the two most important Red Sea ports in their time were Myos Hormos and Berenike.⁸³ Strabo lists the ports in the following order: Philo-teras, Arsinoe, Myos Hormos and Berenike. Pliny deviates from this: Arsinoe, Philo-teras, Myos Hormos and Berenike. The difference between the two accounts could be attributed to scribal error. The important point is that this does not accord with the second-century

⁷⁹ G. Young, *Rome's Eastern Trade: International Commerce and Imperial Policy 31 BC–AD 305* (London and New York, 2001), 75–9, maintains the argument that the canal was used for trade, but there is no good reason to do so.

⁸⁰ Eutropius, *Brev.* 8. 3.

⁸¹ For liturgists, see *P. Oxy.* LV 3814 (third/fourth century); *P. Cair. Isid.* 81 (AD 297) = *SB V* 7626; *P. Oxy.* XII 1426 (AD 332). For officials, see *PSI VI* 689; *PSI I* 87; *P. Wash. Univ.* I 7 (fifth/sixth century). It was common for workmen to be taken to work far from their home villages to work on dykes, see *P. Oxy.* XII 1247 (third century).

⁸² *P. Lond.* IV 1346 (AD 710) and *P. Lond.* IV 1336 (AD 709).

⁸³ Strabo 2. 5. 12; 16. 4. 24; Pliny, *NH* 6. 26. 102–4. For discussion, see S. E. Sidebotham, *Roman Economic Policy in the Erythra Thalassa 30 BC–AD 217* (Leiden, 1986), 49–53.

geographer Ptolemy, who placed Myos Hormos at the site of 'Abu Sha'ar, 150 km north of Quseir, and located a port called Leukos Limen at Quseir. Ptolemy's location was, until recently, universally accepted, but there is good reason to doubt him in this instance. We will consider some of the reasons in what follows, but here we should note that the main argument for locating Myos Hormos at 'Abu Sha'ar rests on shaky evidence. Fresh discoveries of ostraca on the route between Koptos and Quseir confirm the location of Myos Hormos at that site.⁸⁴ Recent archaeological work at Abu Sha'ar has revealed no sign of Roman occupation before the early fourth century,⁸⁵ which again militates against Myos Hormos being located there. What of the port of Leukos Limen? Ptolemy's is the only attestation of this port, and it is likely that he has confused Myos Hormos (Quseir) with the port of Leuke Kome on the Arabic side of the Red Sea, which he ignores elsewhere.⁸⁶ The port of Philoteris has not yet been identified.

Therefore the main settlements on the Red Sea coast, from north to south, were Abu Sha'ar, Philoteris (?), Myos Hormos and Berenike. Two major desert routes linked Myos Hormos and Berenike with Koptos in the Nile Valley. In addition to these, a route extended north-east from Caenopolis to the quarries of Mons Porphyrites and Mons Claudianus, and continued to the coast at Abu Sha'ar. Less frequented were routes from Berenike which traversed the desert to Edfu and Syene.⁸⁷

The route from Caenopolis to the quarries of Mons Porphyrites and Mons Claudianus was heavily used during the first two centuries AD. It seems to have existed solely for the purposes of stone transport and supplying the quarries. There seems to have been no permanent presence at Abu Sha'ar until the fourth century, indicating that trade

⁸⁴ For discussion of the problem and presentation of new evidence, see A. Bülow-Jacobsen, H. Cuvigny, and J-L. Fournet, 'The identification of Myos Hormos: new papyrological evidence', *BIFAO* 94 (1995), 27–42.

⁸⁵ Sidebotham, *Roman Economic Policy*, 17–19.

⁸⁶ Bülow-Jacobsen *et al.*, 'Identification of Myos Hormos', 28. See most recently, H. Cuvigny, *La Route de Myos Hormos*, 2 vols (Cairo, 2003) i 24–7. On Leuke Kome, see *ead.*, 28–30.

⁸⁷ See S. E. Sidebotham and R. E. Zitterkopf, 'Routes through the Eastern Desert of Egypt', *Expedition* 37.2 (1995), 39–51 for a general treatment.

was not a factor on the route to Caenopolis.⁸⁸ The route was well supplied with watering stations, which, although not placed at regular intervals, were closer together than those found on other desert routes.⁸⁹ A distinguishing feature of the installations along these routes was the provision of animal lines and watering troughs at the *praesidia*, which were often larger in area than the forts themselves, suggesting that large numbers of animals were engaged in the transport of quarried stone.⁹⁰ Like all routes in the Eastern Desert, there is little evidence of paving, but this was unnecessary on flat wadi floors, and would have been hard to maintain, especially in view of the damage that could result from periodic flash floods.

The road from Koptos to Myos Hormos is mentioned by Strabo:

In previous times the camel merchants travelled by night using the stars as their guide, like sailors. They carried water with them when they travelled. But, now they have built *hydreumata* by digging to great depths and have built cisterns for rain water, which is scarce. The journey takes six or seven days.⁹¹

The distance between Koptos and Myos Hormos is some 173 km, and Strabo's estimate of the length of the journey between the two is compatible with this distance. It is likely that cairns marked the route in the Ptolemaic period, as they had in others; but it seems clear that there was significant investment in the road's infrastructure early in the Roman period. It is tempting to connect Strabo's statement elsewhere that there was a significant increase in trading activity in

⁸⁸ S. E. Sidebotham, 'University of Delaware Archaeological Project at 'Abu Sha'ar: the 1992 season', *NARCE* 161–2 (1993), 1–9; id., 'Preliminary Report on the 1990–91 seasons of fieldwork at 'Abu Sha'ar (Red Sea Coast)', *JARCE* 31 (1994), 263–75; and S. E. Sidebotham and R. E. Zitterkopf, and J. A. Riley, 'Survey of the 'Abu Sha'ar—Nile Road', *AJA* 95 (1991), 571–622.

⁸⁹ Sidebotham, *Roman Economic Policy*, 62 on the spacing of *hydreumata*. On water management in the Eastern Desert, see S. E. Sidebotham, 'Ptolemaic and Roman water resources and their management in the Eastern Desert of Egypt', in M. Liverani (ed.), *Arid Lands in Roman Times: Papers from the International Conference* (Rome, July, 9th–10th 2001) (Rome, 2003), 87–116.

⁹⁰ Sidebotham, *Roman Economic Policy*, 62–4; V. A. Maxfield, 'Stone quarrying in the Eastern Desert with particular reference to Mons Claudianus and Mons Porphyrites', in D. Mattingly and J. Salmon, (ed.) *Economies beyond Agriculture in the Classical World* (London, 2001), 143–70, esp. 160–1.

⁹¹ Strabo 17. 1. 45 (trans. Loeb). On the route generally, see Cuvigny, *La Route de Myos Hormos*.

the Red Sea under Augustus with the construction of wells and cisterns, guarded by *praesidia*.⁹² A well-known inscription from Wadi Umm Wikala demonstrates considerable imperial interest in the mineral resources of the region in AD 11, and a continued interest is shown by the presence of inscriptions of Tiberian date (AD 14–37) from Wadi Umm Wikala, Wadi Hamamat and of course, further north at Mons Porphyrites.⁹³ Interest in the region continued into the second and early third centuries AD. Therefore the roads and stations on this route served a dual function, for they protected the granite quarries at, on, or near the route and catered for their associated communities as well as the travellers and merchants using the route.⁹⁴ Indeed, it is impossible to separate the Romans' interest in the raw materials of the Eastern Desert and the infrastructure this demanded (in terms of military activity and the construction of stations) from the benefits this bestowed on trading activity in the region.

This is true also of the route linking Koptos to Berenike, which is well documented. Pliny the Elder provides a detailed description, even if the details of stations in his account differ from that of the Antonine Itinerary and Peutinger map:

The journey from Koptos is made by camel. There are watering stations placed along the route [*aquationum ratione mansionibus dispositis*]. The first is called Hydreuma, and is 22 Roman miles [from Koptos]. The second is in the mountains and is a day's journey. The third is called Hydreuma and is 85 Roman miles [from Koptos]. The fourth is in the mountains. The fifth is the Hydreuma of Apollo, 184 Roman miles from Koptos. The sixth is in the mountains. The seventh is at Novum Hydreuma, 230 Roman miles from Koptos. There is another old Hydreuma, called Trogodyticum, where there is a fort [*praesidium*] which accommodates 2000 people. Trogodyticum is

⁹² Strabo 2. 5. 12. There is evidence for the construction of *praesidia* and *hydreumata* in the Flavian and Trajani/Hadrianic period, but of course these supplemented the existing infrastructure.

⁹³ *I. Pan.* 51 = *SEG XX* 670 from Wadi Semna; *CIG III* 4716d from Wadi Hammamat. On Mons Porphyrites, see W. Van Rengen, 'A new Paneion at Mons Porphyrites', *CdÉ* 70 (1995), 240–5. On Wadi Semna, see most recently, S. E. Sidebotham, H. Barnard, J. A. Harrell, and R. S. Tomber, 'The Roman quarry and installations in Wadi Umm Wikala and Wadi Semna', *JEA* 87 (2001), 135–70.

⁹⁴ On the construction and purpose of the *praesidia*, see Cuvigny, *La Route de Myos Hormos*, i 73–191. On chronology, see ead. 192–204.

7 Roman miles distant from Novum Hydreuma. There is Berenike town, where there is a port on the Red Sea, 257 Roman miles from Koptos.⁹⁵

Pliny's account is imprecise on a number of counts, especially in comparison to the later itineraries.⁹⁶ The Antonine Itinerary preserves information on a larger number of stations, although clearly new ones may have been added after Pliny's time, and there are minor discrepancies in the total distance (257 Roman miles in Pliny, 258 in the Antonine Itinerary), and in the distance from Koptos to a number of stations. His claim that the Hydreuma Vetus at Trogodyticum (probably to be identified with the Cenon Hydreuma mentioned in the Itinerary) possessed a *praesidium* capable of housing 2000 individuals is surely an exaggeration. There is no good evidence for the sizes of garrisons at Eastern Desert stations, but there is reason to believe that they were small and were perhaps supplemented by roving patrols, and certainly before the extensive building of *praesidia* in the Flavian and Trajanic/Hadrianic period such forts were small, unfortified and probably did have small garrisons.⁹⁷

Pliny fails to mention the route from Koptos to Myos Hormos, concentrating as he does on Berenike. There is a temptation to read too much into this omission. Strabo's account of Berenike has been taken to imply that no harbour facilities existed at Berenike in the early Roman period, and because he mentions Myos Hormos a number of times in connection with the eastern trade it has been suggested that Myos Hormos was the principal Red Sea port in the late first century BC and early first century AD.⁹⁸ At some point in the first century AD, Berenike, it is argued, took over the role of principal

⁹⁵ Pliny, *NH* 6. 26. 102–3 (trans. adapted from the Loeb).

⁹⁶ For discussion, see Sidebotham, *Roman Economic Policy*, 60–1.

⁹⁷ C. E. P. Adams, 'Supplying the Roman army: *O. Petr.* 245', *ZPE* 109 (1995), 119–24, for estimates on the possible size of the garrison at Apollonis Hydreuma. However, as discussed further below, these figures seem, in the light of a recent survey, to be too small. An upper figure of 215 in the Flavian period and beyond seems appropriate. See also, Cuvigny, *La Route de Myos Hormos*, ii 307–9. Mons Claudianus was probably the largest community in the Eastern Desert, with a population estimated at around 900.

⁹⁸ Sidebotham, *Roman Economic Policy*, 52, suggests that the harbour facilities of Ptolemy II at Berenike had fallen into disrepair by the time of Augustus. But there is evidence for construction in the reign of Tiberius.

port. Pliny's omission of Myos Hormos, and its minimal mention in the *Periplus Maris Erythraei*, is taken to suggest that Berenike was the more important of the two.⁹⁹ The reality is far from clear. It seems to be stretching the evidence of the *Periplus* to suggest this, and it is clear from the so-called Archive of Nikanor, which will be discussed below, that both ports seem to be of roughly equal importance, in so far as it is possible to tell from such a sample.¹⁰⁰ Archaeology at the site of Berenike suggests that there was an increase in activity during the late first century BC and into the first century AD, but a distinct lull in activity from the second to fourth centuries AD (despite epigraphic evidence from this period) runs counter to the suggestion that Berenike was the principal port of the first three centuries.¹⁰¹ Recent excavations at Quseir, the site of Myos Hormos, show Roman occupation extending from the first century AD into the third century, when it ceased, and the continued use of the Koptos–Myos Hormos road in the first three centuries AD suggests a continuing importance. It is perhaps best to assume that Pliny omitted Myos Hormos by mistake, and not take his omission to be suggestive of one port being more important than the other, at least in the first century AD. Any assumptions about the relative importance of the ports based on the literary evidence are hazardous and probably unnecessary.

To the south of Koptos, a route connected the Nile Valley at Edfu with Berenike. Pharaonic graffiti suggest that this route was used at least then, and epigraphic evidence indicates that it was still important under the Ptolemies.¹⁰² In the Roman period, its use

⁹⁹ See Young, *Rome's Eastern Trade*, 44, with L. Casson, *The Periplus Maris Erythraei* (Princeton, 1989), 97.

¹⁰⁰ Noted by Sidebotham, *Roman Economic Policy*, 50–1.

¹⁰¹ The results of excavations at Berenike are summarized in S. E. Sidebotham, 'The Roman Empire's south eastern-most frontier; recent discoveries at Berenike and environs (Eastern Desert of Egypt) 1998–2000', in P. Freeman, J. Bennet, Z. Fiema, and B. Hoffman (ed.) *Limes XVIII: Proceedings of the XVIIIth International Congress of Roman Frontier Studies held in Amman, Jordan* (September 2000) 2 vols (Oxford, 2002) i 361–78, with full bibliography. See also, S. E. Sidebotham, 'Reflections of ethnicity in the Red Sea commerce in antiquity: evidence of trade goods, language and ethnicity from the excavations at Berenike', in P. Lunde and A. Porter, *Trade and Travel in the Red Sea Region: Proceedings of Red Sea Project I Held in the British Museum* (October 2002) (*BAR* is 1269, 2004), 105–15.

¹⁰² See A. Bernard, *Le Paneion d'el-Kanaïs les inscriptions grecques* (Leiden, 1972) *passim*, and for the Ptolemaic period I. Pan 1–44. On El-Kanaïs in the Pharaonic period, see S. Schott, *Kanaïs: Der Tempel Sethos I im Wadi Mia* (Göttingen, 1961).

may have declined with the increasing popularity and the better infrastructure of the route from Berenike to Koptos, although there is clear evidence for some use. Two inscriptions attest the passing of cavalry troops at El-Kanais (c.40 km from Edfu) probably in the early Roman period, and one the passing of a *naukleros*, probably a Red Sea captain.¹⁰³ Another attests the presence of a man named Chresimos, who may be the same Marcus Ulpius Chresimos who appears in inscriptions from Mons Claudianus and Mons Porphyrites at the beginning of Hadrian's reign, and seems to have been widely travelled.¹⁰⁴ Finally, a soldier named Crispinus, attached to the First Cohort of Lusitanians based at Contrapollonopolis Maior, dedicated an inscription at El-Kanais during the reign of Commodus.¹⁰⁵

The final route linking the Nile Valley to the Red Sea coast was the Via Hadriana, constructed after AD 130. This linked Hadrian's new city of Antinoöpolis to the coast near 'Abu Sha'ar el-Bahri just south of Ras Gharib, before running south along the coast to reach Berenike.¹⁰⁶ An inscription of Hadrianic date offers some evidence for the forging of the route and construction of its installations:

On the route see S. E. Sidebotham, 'Caravans across the Eastern Desert of Egypt: recent discoveries on the Berenike–Apollonopolis Magna–Koptos roads', in A. Avanzini (ed.), *Profumi d'Arabia: Atti del Convegno (Saggi di Storia Antica)* (Rome, 1997), 385–93; id., 'From Berenike to Koptos: recent results of the desert route survey', *Topoi Supp.* 3 (2002), 415–38.

¹⁰³ Cavalry: *I. Pan.* 55 and 56. The *naukleros* Severus son of Moschion is attested in *I. Pan.* 57.

¹⁰⁴ *I. Pan.* 59. See also, *OGIS* 678 on Mons Claudianus; *CIL* III 7146 which may attest his presence in Lydia, and earlier he may have been at Paros; see Bernard's commentary p. 130 n. 8. Bernard notes that he may also have visited the Valley of the Kings, cf. J. Baillet, *Inscriptions grecques et latines des tombeaux des rois ou Syringes* (Cairo, 1926), no. 520.

¹⁰⁵ *I. Pan.* 59b.

¹⁰⁶ On Antinoöpolis, see most recently M. T. Boatwright, *Hadrian and the Cities of the Roman Empire* (Princeton, 2000), 190–6. On the *Via Hadriana* see Sidebotham, *Roman Economic Policy*, 61–2; S. E. Sidebotham and R. E. Zitterkopf, 'Survey of the Via Hadriana by the University of Delaware: the 1996 season', *BIFAO* 97 (1997), 221–37; id., 'Survey of the Via Hadriana: the 1997 season', *BIFAO* 98 (1998), 353–65; S. E. Sidebotham, R. E. Zitterkopf, and C. C. Helms, 'Survey of the Via Hadriana: the 1998 season', *JARCE* 37 (2000), 115–26.

Imperator Caesar Traianus Hadrianus Augustus, son of the divine Traianus Parthicus and grandson of the divine Nerva, Pontifex Maximus, with tribunician power for the 21st time, emperor for the second time, consul for the third time, father of his country, built the new Via Hadriana from Berenike to Antinoöpolis through safe and level terrain to the Red Sea spaced with many wells, stations and garrisons. The 21st year. Phamenoth 1.¹⁰⁷

The purpose of the route is not clear. It has been suggested that the opening of a route from Antinoöpolis to the coast would have allowed it to become a trading centre, and perhaps to compete with Koptos.¹⁰⁸ Equally, it may have served as a route for the transport of quarry produce from the desert quarries to the Nile Valley. There is, however, no evidence for either, and no evidence that Antinoöpolis ever competed with Koptos as a Nile emporium. The Via Hadriana lacked the numerous stations that were a feature of the Koptos routes, and must therefore have served an administrative and military purpose, providing a means of communication rather than anything else.¹⁰⁹ The possibility that Hadrian wanted to emulate Trajan in his construction of communication routes through desert should not be disregarded, neither should the possibility that he built such roads as a display of power over provincial landscapes.¹¹⁰

¹⁰⁷ IGRR I 1142 = OGIS 701 = *I. Pan.* 80. See E. Miller, 'Sur une inscription grecque découverte à Cheick Abad, l'ancienne Antinoé', *Revue archéologique* 21 (1870), 313–18.

¹⁰⁸ On Antinoöpolis as a port, see briefly D. Kessler, 'Beiträge zum Verständnis der Obelisken', in A. Grimm, D. Kessler, and H. Meyer, *Der Obelisk des Antinoos* (München, 1994), 91–2. Just because Antinoöpolis had good port facilities on the Nile need not indicate importance in Eastern trade, merely that the site for the city in the Nile Valley was a good one. Young, *Rome's Eastern Trade*, 78–9, wrongly maintains that trade was the central purpose of the route. His argument that the 'wording' of IGRR I 1142 suggests commercial use is unfounded.

¹⁰⁹ Sidebotham and Zitterkopf, 'Survey of the Via Hadriana: 1996', and personal communication.

¹¹⁰ On provincial creation, see N. Purcell, 'The creation of a provincial landscape: the Roman impact on Cisalpine Gaul', in T. Blagg and M. Millett (ed.) *The Early Roman Empire in the West* (Oxford, 1990), 6–29. There is some speculation that construction of this road was begun under Trajan, see K. Meister, 'Zur Datierung der Annalen des Tacitus und zur Geschichte der Provinz Ägypten', *Eranos* 46 (1948), 115. This seems doubtful, as the construction of the road is unlikely to have pre-dated the foundation of Antinoöpolis itself.

TRAVELLING AROUND IN EGYPT: TRAVEL,
TIME, AND DISTANCE

In our survey of the transport network of Egypt, it is no doubt apparent that the papyrological record offers little directly relevant information. However, we now turn to the issue of the experience of travel, and here papyri afford a rich picture.¹¹¹ Rather than being a localized, static society where travel was restricted, Roman Egypt was a society characterized by movement and connectivity—and the Nile was central to this. The manifold opportunities offered to individuals by Roman control arguably had the effect of creating a freer and more mobile society than had existed in Egypt in previous periods.¹¹²

Reasons for travel that can be seen in our evidence are many and varied, ranging from purely private purposes, such as visiting family or attending festivals, to those more readily described as public business, for example official state matters or attending court hearings. Of more interest are the difficulties experienced when travelling, from topographical impediments and the impassibility of roads, discussed above, to brigandage. As we would expect, the difficulties of desert travel figure the most in our evidence. In addition to the passages of Pliny and Strabo discussed above, other ancient writers note the hazards of the desert. Aelius Aristeides notes the waterless environment of the Eastern desert quarries,¹¹³ while in pilgrimage texts such as that of Egeria, the *Historia Monachorum*, and the *Life of St Antony*, the perils of the desert—‘the terrible desert’—are readily apparent. If the *Historia Monachorum* represents an account of a real journey, and there is reason to think it does, then it may be compared with the small number of itineraries preserved on papyrus, the most important of which is contained within the so-called Archive of

¹¹¹ See Adams, ‘There and back again’, for a fuller survey.

¹¹² For travel in Pharaonic Egypt, see J. Baines, ‘Travel in third and second Millennium Egypt’, in C. E. P. Adams and J. Roy (ed.), *Travel, Geography and Culture in Ancient Greece and the Near East* (Oxford, forthcoming), who stresses the link between elites, government and travel, but also notes the necessity to travel between land holdings, but again this is associated with elites.

¹¹³ Aelius Aristeides, *Or.* 26. 67.

Theophanes, though the purpose of the two is different, and they contain different information. An interesting feature of travel as depicted in these texts is the interplay between land and river transport. Theophanes' journey from Hermopolis Magna in Middle Egypt to Antioch in Syria begins by river to Alexandria, and then follows a land route through the Delta region to Pelusium, from whence he continues by road along the coasts of Palestine and Lebanon to his destination. In the only other preserved papyrus itinerary, travel is clearly made by river, but the stopping points used by the travellers correspond to those localities mentioned as points in the Antonine Itinerary and the Peutinger map, and it is possible that accommodation was sought at the *mansiones*, the regular roadside stopping points.

Elsewhere in the papyri, travel is mentioned only incidentally. Typically, though, it is difficult to find answers to our most important question: how fast was travel? The difficulty is that individuals travel at different speeds according to variables such as the importance and urgency of the journey, whether on foot or by animal, and according to the nature of the terrain traversed. In one third-century papyrus, a man writes to his wife in the village of Philadelphia that he had made the journey from there to Alexandria in 4 days, while in a fragmentary itinerary from Oxyrhynchos, the traveller took 5 days off from their journey at different stages in order to bathe.¹¹⁴ Government messengers, as part of the *Cursus Publicus*, travelled quickly, perhaps even according to a set timetable, while others took a more relaxed approach. It is generally accepted that the journey time from Alexandria to the Arsinoite was 5 days, and from the Arsinoite to Thebes, 10 days.¹¹⁵

Travel between villages in the valley and Fayum could perhaps be most easily achieved on foot, and the distances travelled were generally short. This is well illustrated by a private letter from Karanis in the Fayum, in which a friend urges the recipient to travel from Bakkhias, 'for those who come from there arrive within two hours'.¹¹⁶ In the desert regions, distances travelled were much greater.

¹¹⁴ BGU VII 1680 = *Sel. Pap.* I 134; *P. Oxy.* XLII 3052 (first century).

¹¹⁵ D. W. Rathbone, 'The dates of the recognition in Egypt of the emperors from Caracalla to Diocletian', *ZPE* 62 (1986), 102–3.

¹¹⁶ *P. Mich.* VIII 496 (second century).

The longest route, from Koptos to Berenike, according to Pliny, took 12 days, which means an average distance of 30 km per day.¹¹⁷ The shorter (174 km) route between Koptos and Myos Hormos took 5 days at a similar speed. It is certainly the case that these journeys could be made in a much shorter time, as they assume only one stage in 24 hours, but as it is likely that members of the caravan may be on foot as well as in the saddle, an average of 30 km per day in such arid conditions is generous. Presumably the logistics of large and heavily laden caravans might demand such a pattern, but on the other hand it was possible to travel much more quickly with two stages in a day and minimum rest. Just such a journey is attested in a papyrus preserving details of a journey made between Kharga and Dakhla (200 km) in 4 days.¹¹⁸ In the case of transport in a commercial context, which will be considered more fully below, it is probable that the duration of journeys was stipulated within any contract between transporters and merchants (when they were not one and the same). Just as in shipping contracts, which usually contained a clause stating that the shipper was to stop at designated anchorages en route, it is likely that the delivery of a caravan's cargo was to be made by a certain time.¹¹⁹

As a rule of thumb, 30 km travel by land per day in desert environments seems a reasonable average, though it was clearly possible to move much more quickly. Travelling downstream along the Nile was certainly quicker, and if used in conjunction with land travel, was efficient. Upstream travel is understandably slower, and in this case more rapid progress could be made on the Bahr Yusef, the major canal running parallel to the Nile for a significant length of its course through Lower Egypt.¹²⁰ Journey times are too varied, and the variables governing them too many, for any really useful quantification beyond the examples discussed, though Richard Duncan-Jones has attempted to with some evidence for the speed with which news of an emperor's death would reach far flung parts of the empire.¹²¹

¹¹⁷ Pliny, *NH* 6. 102.

¹¹⁸ *M. Chr.* 78, cited by A. Bülow-Jacobsen, 'The traffic on the road and the provisioning of the stations', in Cuvigny, *La Route de Myos Hormos*.

¹¹⁹ A good example is *P. Ross Georg.* II 18 (AD 140).

¹²⁰ Almost certainly the case in the journey detailed in *P. Oxy.* XLII 3052, noted above.

¹²¹ R. Duncan-Jones, *Structure and Scale in the Roman Economy* (Cambridge, 1990), 7–29.

In conclusion, transport in Egypt was greatly facilitated by the Nile, but our focus here has been on the overland networks of communication and how the geography and topography for the country affected them. There is little doubt that travel by land in the Nile Valley was facilitated by at least two major roads running its length; the number of roads and their importance increased in proportion to their distance from the Nile. The Fayum and the desert regions of Egypt relied on good road connections with the valley for their survival, and we must view the Nile as part of a system of transport including overland routes, rather than as the sole transport artery.

Part II

Transport Resources

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Transport Animals and Wagons

The purpose of this chapter is to introduce the different types of transport animal used in Roman Egypt and to consider their particular advantages or disadvantages to transport. It considers the rather more limited use of wagons and other wheeled vehicles, assesses how they are represented in the papyrological record, and aims to establish patterns of use, which may have been dictated by the type of transport they performed or by topographical factors. This will set the scene for our discussion of animal ownership in the following chapter.

Despite their ubiquity, the role of pack animals in the ancient world is often ignored by scholars, usually in favour of the more glamorous horse as a cavalry animal, or the more exotic elephant as a weapon of war. The donkey was ignored, unless a subject of fun and parody, for example in Apuleius or Aelian. Camels were the subject of folklore, especially in Egypt where they seem to have been associated to some degree with the god Seth, and of speculation as to their peculiar physiology. Otherwise, pack animals are largely disregarded probably because they were so common, and their role in society and the economy so well understood and ordinary.

THE CAMEL IN EGYPT

The camel, over the centuries, has certainly become the transport animal par excellence in desert climates, and its contribution to the economic life of Egypt is no exception to this rule. However, the camel is not indigenous to Egypt, and one of the most tantalizing

problems facing the historian is the question of exactly when the camel was introduced. Indeed this has been the subject of much debate.¹ It is probable that the camel existed in Egypt during the Pharaonic period: terracotta figurines of camels have been found dating to the dynastic period; and certainly it was present by at least the end of the second millennium BC, judging by faunal remains.² What is not clear, and which is far more important for our purposes, is when the camel was introduced into the economic life of Egypt. They do not seem to have been used as transport animals in the Pharaonic period, and it has been suggested that there was a religious injunction against their use, possibly due to their association with Seth.³ It is, however, doubtful if such an injunction would have extended to the levels of society concerned with using camels as transport animals. It has also been argued that camels could not adapt easily to the highly irrigated Nile Valley, but they do seem to have been used, albeit to a limited extent, in these regions in the Roman period.⁴ It seems best to suggest that the camel gradually came to be used extensively in the desert, but was only very slowly integrated into the economic life of the Nile Valley.⁵

As late as the Ptolemaic period, the role of the camel in society is vague. Although Wilcken long ago noted that camels were rarely

¹ The most recent discussion of the introduction of the camel is by B. D. Shaw, 'The camel in Roman North Africa and the Sahara: history, biology and economy', *BIFAN* 41, Ser. B. 4 (1979), 663–721, reprinted in id., *Environment and Society in Roman North Africa* (Aldershot, 1995), including a comprehensive bibliographical survey of the question of its introduction to North Africa. See also E. Demougeot, 'Le Chameau et l'Afrique du Nord romaine', *Annales (E. S. C.)* 15 (1960), 209–47; B. Midant-Reynes and F. Braunstein-Silvestre, 'Le Chameau en Égypte', *Orientalia* 46 (1977), 337–62; R. T. Wilson, *The Camel* (London, 1984), 9–10.

² On terracotta figures, see Midant-Reynes and Braunstein-Silvestre, 'Le chameau en Égypte'; G. Nachtergaele, 'Le Chameau, l'âne et le mulet en Égypte gréco-romaine: Le témoignage des terres cuites', *CdÉ* 64 (1989), 287–334. Recently, a terracotta figurine of what appears to be a dromedary, dating to the Saite period (664–525 BC), has been found at Qasr Allan in the Bahariya Oasis; see F. Colin, 'Qasr Allan: a Twenty-Sixth Dynasty Settlement', *Egyptian Archaeology* 24 (2004), 30–3; and on faunal remains, see M. Ripinsky, 'The camel in dynastic Egypt', *JEA* 72 (1985), 134–41 and id., 'The camel in the Nile Valley: new radio-carbon accelerator (AMS) dates from Qasr Ibrim', *JEA* 74 (1988), 245–8.

³ O. Keller, *Die antike Tierwelt* (Leipzig, 1909), 275.

⁴ A. Weidemann, *Das alte Ägypten* (Heidelberg, 1920), 198.

⁵ So Westermann, 'On inland transportation', 371.

mentioned in Ptolemaic papyri,⁶ they were certainly used for transport on the estate of Apollonios, as indicated by papyri from the archive of Zenon.⁷ Camels are mentioned in demotic texts from a family archive from Siut dating to the early second century BC, which clearly shows that they were used at least by native Egyptians by this time.⁸ They were used as pack animals by Alexander the Great on his expedition to Siwa.⁹ Despite this, it is supposed that camels were displayed at the great festival of Ptolemy II Philadelphus because they were considered curiosities. This may have been so with Greeks, but it is certain that Egyptians were well acquainted with camels, and, at any rate, there is nothing in the text of Kallixeinos of Rhodes to suggest that camels were extraordinary.¹⁰ On the basis of this, some scholars have suggested that camels were introduced to Egypt in the Ptolemaic period, for camels appear carrying spices from India, which leads Rice, commenting on the text of Kallixeinos, to suggest that camels were introduced through the spice trade with Arabia. This is also proposed by Forbes, who notes Diodorus' statement that the *sarakenoi* living in Arabia Felix excelled in the breeding of camels, and that a migration of Arabian camel-drivers into the Nubian desert introduced camels to Egypt.¹¹ Such suggestions stretch this meagre evidence, and ignore archaeological evidence for the presence of camels in the dynastic period.

⁶ U. Wilcken, *Griechische Ostraka aus Ägypten und Nubien* (Leipzig and Berlin, 1899), i 373.

⁷ For example, *P. Cairo Zenon* I 59008; II 59143; 59207; V 59802; 59835; *BGU VI* 1351; 1353; *P. Mich. Zenon* 103. See M. Rostovtzeff, *A Large Estate in Egypt in the Third Century BC* (Madison, Wisc., 1922), 107–10. For references to camels in the Ptolemaic period, see *P. Lug. Bat.* 21 s.v. *καμήλος*. See also, L. Feisel, 'Geleitzölle im griechisch-römischen Ägypten und im germanisch-römischen Abendland', *Nachrichten von der Gesellschaft der Wissenschaften zu Göttingen. Phil.-Hist. Klasse* (Göttingen, 1925), i 95–103. See also, M. Schnebel, *Die Landwirtschaft im hellenistischen Ägypten* (Munich, 1925), 332–5.

⁸ *P. Brit. Mus.* 10591 recto I, 24.

⁹ See Quintus Curtius 4. 7. 12; 5. 2. 10; 5. 6. 9; 8. 4. 19; Arrian, 6. 27. 6; and Plutarch, *Alex.* 37. 2 for the use of camels. For commentary on Quintus Curtius, see J. E. Atkinson, *A Commentary on Q. Curtius Rufus' Historiae Alexandri Magni Books 3 and 4* (Amsterdam, 1980). On the journey to Siwa, see Demougeot, 'Le chameau en Égypte', 218–19.

¹⁰ See text in E. E. Rice, *The Grand Procession of Ptolemy Philadelphus* (Oxford, 1983), 200 F, l. 172 and 201 A, l. 175, with commentary at 92–3.

¹¹ R. J. Forbes, *Studies in Ancient Technology II* (Leiden, 1993), 193–213.

Whatever the case, it seems that the camel was known in Egypt from the Pharaonic period, and certainly by the Ptolemaic when it was used as a transport animal.¹² Its use does not seem to have been widespread, and Bulliet, in his account of the camel through various historical periods, claims that ‘the camel had still not made itself felt in the Egyptian economy overall’ by the Ptolemaic period.¹³ Despite the deficiencies of Bulliet’s work in other respects, which we will consider further below, this statement does seem to reflect the truth. It is in the Roman period that the use of camels became widespread, and certainly their appearance in both literary and documentary evidence increases.

THE CAMEL IN ROMAN LITERATURE

Strabo is the earliest writer of the Roman period to mention camels. He states that in earlier times in the Eastern Desert of Egypt, camel-drivers travelled mostly by night in order to avoid the excessive heat of the daytime, and that they carried water with them, as Alexander had done on his journey to Siwa.¹⁴ The implication is clear: that camels had been used in caravans in the Eastern Desert in Ptolemaic times. By Strabo’s time, however, wells (*hydreumata*) had been constructed to facilitate transport in this inhospitable region. Pliny the Elder similarly notes that camels were used on the journey from Koptos to the Red Sea coast, but also records some interesting details on camel physiology, which fell outside Strabo’s purview.¹⁵ Pliny noted that there are two types of camel, dromedary and bactrian, and that both served as beasts of burden, although they were sometimes used as war mounts.¹⁶ He notes a number of other

¹² There is clear evidence for this in *P. Mich.* inv. 6981, see T. Gagos and L. Koenen, ‘The University of Michigan Papyrus Collection’, in I. Andorlini *et al.* (ed.), *Atti del XXII Congresso Internazionale di papyrologia* (Florence, 2001), 533–6.

¹³ R. Bulliet, *The Camel and the Wheel* (Harvard, Mass., 1975), 16–17.

¹⁴ Strabo 17. 1. 45.

¹⁵ Pliny, *NH* 6. 102.

¹⁶ Pliny, *NH* 8. 67. The use of camels in war was misunderstood by ancient authors, see Shaw, ‘The camel in Roman North Africa’, 707–16.

details, mainly concerned with reproduction, but more importantly that camels do not travel beyond their customary march, nor do they carry loads that are too heavy. They can endure thirst for up to 4 days, but only drink muddy water—clean water being distasteful to them. Finally, they were often smeared in fish oil by their drivers to ward off gadflies, to which camels are particularly susceptible given their sparse body hair.¹⁷

Ancient writers were certainly aware of the camel's suitability for desert travel, even if they could not fully understand its physiology.¹⁸ Aelian, in his treatise on animals, notes (probably following Pliny) that the camel does not like clear water and that it can endure up to 8 days without drinking. The animals' longevity was also worthy of note, and Aelian records that camels live for 50 years, and those from Bactria can live twice as long.¹⁹ The reference to distaste for clean water is interesting and important. The camel's ability to function without water is often exaggerated, but efficient sweating, good renal function, and a reduced flow of urine, all combine to enable it to drink water with a very high salt content, which must be what Pliny and Aelian refer to. Finally, Vegetius, in his *Epitoma Rei Militaris*, states that the camel is 'a type of animal well adapted to sands and enduring thirsts, and is said to keep straight on roads without error even when they are obscured by dust in the wind. However, apart from its novelty when it is seen by those not used to it, it is useless in battle.'²⁰

In the early Roman period in Egypt, there was a considerable increase in desert traffic between the Nile Valley and Red Sea coast. The Romans expanded upon the existing Ptolemaic practice of using these animals for such transport, which meant, in the Roman period, a general increase in camel use in Egypt.²¹ The main reason why camels were able to dominate desert transport was their unique

¹⁷ Shaw, 'The camel in Roman North Africa', 705.

¹⁸ Diodoros Siculus 2. 54. 6 notes that dromedary camels can travel great distances in waterless and desert areas. Bactrian camels, he notes, could carry as much as 10 *medimnoi* of wheat (some 900 lbs weight).

¹⁹ Aelian, *HA* 17. 7 and 4. 55.

²⁰ Vegetius 3. 23 (trans. Milner). Vegetius is here referring to the incorrect theory that horses are frightened of camels and will not charge them.

²¹ Note Strabo's comment about the increase in trade in this region at 2. 5. 12 and 17. 1. 13.

physiology. Their ability to overconsume and store energy as fat in their humps is well established, but their capacity to function without water was until recently misunderstood and often exaggerated.²² The camel does not store water, but rather conserves it through a minimum loss of water in body waste. It is also able to endure a body temperature variation of 7–9°C in accordance with the rise and fall of air temperature. Normal mammals usually maintain a body temperature within a range of 1°C, and are required to expend large amounts of water to achieve this. Efficient sweating, fat concentrated in the hump rather than around the body, and sparse body-hair, all help to decrease water loss in camels. But they can also endure a massive fluid loss of up to 30 per cent of their total body weight, which is fatal to other mammals. Additionally, they can rapidly replace this lost water by overcompensating and drinking far more than other mammals could tolerate, as they can control the speed of fluid absorption, and absorb water into their bloodstream. This enables them to restore renal function quickly and to return to a physiologically normal condition.²³ Thus in summer months they can travel 20 km per day, enduring thirst for 3 to 5 days, while in winter, 25 km per day, with 5 to 7 days without rewatering. If vegetation is available, however, camels may be able to operate even longer without water.²⁴

Camels are less suited to more humid conditions, such as those found in the Nile Valley and Fayum. Due to high levels of irrigation

²² Shaw, 'The camel in Roman North Africa', 701.

²³ On the physiology of camels, see K. Schmidt-Nielsen, *Desert Animals: Physiological Problems of Heat and Water* (New York, 1964) *passim*; see also, Z. Etzion, and R. Yagil, 'Renal function in camels (camelus dromedaries) following rapid rehydration', *Physiological Zoology* 59 (1986), 558–62 and S. Benlamlah *et al.*, 'Fluid retention after oral loading with water of saline in camels', *American Journal of Physiology* 262 (1992), 915–20. On the adaptability of camels to desert environments, see H. Gauthier-Pilters and A. I. Dagg, *The Camel: Its Evolution, Ecology, Behaviour, and Relationship to Man* (Chicago, 1981), 50–77. A useful physiological survey is offered by Shaw, 'The camel in Roman North Africa', 701–7 and by Wilson, *The Camel*, 51–82.

²⁴ H. Gauthier-Pilters, 'Observations sur l'écologie du dromadaire dans le Sahara nord-occidental', *Mammalia* 25 (1961), 195, and *id.*, 'Observations sur la consommation d'eau du dromadaire en été dans la région de Beni-Abbès', *BIFAN* 34 (1972), 220, and 254–5. For a first-hand account of camels' ability to go without water, see G. W. Murray, *Dare me to the Desert* (London, 1967), 70.

in these areas, the ground can be damp, which can result in damage or disease to the animals' feet. They are also susceptible to a wide range of insect-borne disease, especially to those carried by the tsetse fly which breeds in the swamps and *sebkah* regions of North Africa. We should be mindful here of Pliny's statement about camels being smeared with fish oil to ward off flies.²⁵ It seems that the camel, widely used for transport in deserts in the Roman period, never became the principal mode of transport in the Nile Valley. This role was reserved for the more humble donkey, which played a much greater part in such transport than any other animal.²⁶ The conclusion offered by Shaw, that the camel served as a means of long-distance desert transport in Africa, but that donkeys and mules, although almost as hardy, were quicker and cheaper options for short-distance transport, is surely also true for Egypt.²⁷ One caveat to this is that donkeys perform better on rocky terrain, and were therefore used extensively in the quarries of the Eastern Desert, although camels were certainly also widely used.²⁸ In the sandy desert, however, they were supreme, and later, Marco Polo was to offer the reason: 'this is because they eat little, carry heavy loads, and travel long distances in a single day, enduring toil beyond the power of horses and mules.'²⁹

Such conclusions are borne out by the papyrological record. Camels appear infrequently, as we have seen, in Ptolemaic papyri, but there is a marked increase in their appearance in Roman papyri, and certainly they seem to have been favoured for desert travel.³⁰

²⁵ A fragmentary military document of the third century records that camels in military service had been affected by an eye disease (ca[melorum stenoco]riasis): *P. Mich.* 455a recto 4–5, cited by R. Davies, 'The supply of animals to the Roman army and the remount system', *Latomus* 28 (1969), 430, republished in id., *Service in the Roman Army* (Edinburgh, 1989), 154.

²⁶ See R. S. Bagnall, 'The camel, the wagon and the donkey', 4.

²⁷ Shaw, 'The camel in Roman North Africa', 706.

²⁸ On the relative competence of animals on rocky terrain, see Schmidt-Nielsen, *Desert Animals*, 81–93; J. J. Hobbs, *Bedouin Life in the Egyptian Wilderness* (Austin, Tex., 1989), 34–7, and Bagnall, 'Camel, Wagon and Donkey', 4–5 and n. 10.

²⁹ Marco Polo, *The Travels*, trans. R. E. Latham (Harmondsworth, 1958), 61–2.

³⁰ A list of papyri mentioning camels can be found in A. Leone, *Gli animali da trasporto nell'Egitto Greco, Romano e Bizantino* (Rome, 1988), 127–38. The lists contained in the book should be used with caution, as there are many errors and omissions, and Leone's discussion largely ignores all but Italian scholarship.

In what follows, we will notice that transport in the Eastern and Western Deserts was largely the domain of the camel, although donkeys were certainly used. We will see also that camel use in the Fayum was largely restricted to the desert fringes—principally the villages of Socnopaïou Nesos and Dionysias. They seem not regularly to have been employed for transport within the Fayum—and certainly play a comparatively small role in the transport of grain. Bagnall neatly summarizes this point: ‘the camel’s superiorities to the donkey will have had limited use in an environment like the Nile Valley. Greater ranges and endurance, the ability to go long stretches between watering—this is all irrelevant for short trips in a well-watered valley.’³¹

THE DONKEY

In the ancient world, much like today, the donkey was a figure of ridicule. It was a donkey that provided Apuleius with his metamorphic hero, and Aelian rather charmingly noted that ‘it alone of all the animals was not born in tune’.³² Similarly amusing references to donkeys appear in papyri—for example, the early road traffic accident recorded in a papyrus from Oxyrhynchos, where we read of an unfortunate individual who is run over by a donkey, driven by a slave, receiving injuries which he claimed endangered his life. He was, however, sufficiently fit to petition the strategos in no uncertain terms.³³

It is, however, true that it was the most widely used form of transport in the ancient world, and thus played a vital role in the economy of the ancient world as a whole. The donkey is indigenous to Arabia and North Africa, but its use was widespread throughout Europe and Asia. It is sure-footed, economical, and easily mounted, so that it was often preferred to horses, especially on difficult terrain.

³¹ Bagnall, ‘Camel, wagon, and donkey’, 6.

³² Aelian, *HA* 10. 28.

³³ *P. Fuad.* I 26 (AD 59). See also *P. Haun.* II 14 (second century) for an individual injured through a kick from a horse, and *BGU XIII* 2350 (second century) for a similar incident.

Wild donkeys were regularly hunted in the Pharaonic period, and the animal was probably domesticated at an early date, in the late predynastic or archaic period (3150–2686 BC), from the Nubian wild donkey.³⁴ It appears on early Pharaonic stelae, palettes and tomb reliefs as both herd animal and beast of burden—but seemingly rarely as a mount.³⁵ Its use in Egypt was therefore widespread in the Nile Valley and Fayum, while the camel came to dominate desert travel, certainly by the Roman period—‘en Égypte romaine, l’âne est la bête de somme normale, mais le chameau s’adapte mieux aux sol désertique’.³⁶ It is interesting to note, however, that of some 159 animal figurines from Graeco-Roman Egypt, only nine seem to represent donkeys, the majority by far are of camels.³⁷ Donkeys, like camels, were often associated with the god Seth (indeed his head, as depicted on tomb paintings and reliefs, often bears an uncanny resemblance) which may have restricted artistic representation.

Ancient writers recognized the suitability of the donkey for agricultural work of all kinds. Particularly important are Varro’s comments about rearing donkeys, so that the strongest animals possible are bred, and Palladius’ comment that donkeys play an important role in agricultural production because of their toleration of hard work and sturdy nature which meant that they required little maintenance.³⁸ When we come to discuss the maintenance and feeding requirements of transport animals, it will be clear that donkeys required much less attention than horses, making them cheaper to own and maintain, and horses also make poor pack animals.

Donkeys were perfect for the rough terrain and narrow paths found in the Fayum and Nile Valley. Their ability to carry heavy

³⁴ J. Clutton-Brock, *Domesticated Animals from Early Times* (London, 1981), 91. On donkeys, see also, ead., *A Natural History of Domesticated Animals* (Cambridge, 1987), 114–27; A. Dent, *Donkey: The Story of the Ass from East to West* (London, 1972). On Graeco-Roman Egypt, see Schnebel, *Die Landwirtschaft*, 335–8. See more recently, and more specifically for Pharaonic Egypt, R. Partridge, *Transport in Ancient Egypt* (Lytham St. Annes, 1996), a basic and ultimately disappointing account of transport in Pharaonic Egypt.

³⁵ Partridge, *Transport*, 97. See also E. Strouhal, *Life in Ancient Egypt* (Cambridge, 1992), 113.

³⁶ J. Schwartz, ‘De quelques villages du nome Arsinoïte à l’époque romaine’, *CRIPEL* 10 (1988), 147.

³⁷ Nachtergael, ‘Le chameau, l’âne et le mulet’, 287–334.

³⁸ Varro, *De Re Rustica* 2. 6. 1–5; Palladius 4. 14. 4.

loads of up to 150 kg, and sometimes also to act as a mount, made them indispensable for farm work—indeed it has been shown that donkeys can carry a third of their own body weight without any noticeable effect.³⁹ In the desert the camel may be superior, but donkeys can work in desert climates for up to 60 hours without watering, and research has shown that they have a much higher thirst threshold than any other equid.⁴⁰

In the papyri, donkeys appear in almost every conceivable type of documentary text from private letters to state-generated documents such as petitions, prefect's edicts, and correspondence between state officials.⁴¹ This is illustrative not only of the animal's importance to agriculture, but also of the way in which agriculture and transport pervaded every level of society in Roman Egypt. The ubiquity of the donkey and patterns in its use raise no real problems, whereas the use of horses in Egypt does require some investigation.

THE HORSE

Horses are mentioned rarely in the published papyri and seem to have been little used as transport animals.⁴² Their role seems to have been restricted to cavalry use in the army, chariot racing in circuses, and for riding and pulling carriages. Horses are stronger and faster than donkeys, making them particularly suitable for riding or for draught, but they are poor pack animals, as they can carry little more than a donkey (c.170 kg), but cost much more to maintain.

³⁹ D. B. Dill, *The Hot Life of Man and Beast* (Springfield, Ill., 1985), 93–102.

⁴⁰ A. S. Leese, *A Treatise on the One-humped Camel in Health and Disease* (Stamford, 1927), 122; N. Jones, K. A. Houpt, and T. R. Houpt, 'Stimuli of thirst in donkeys (*Equus asinus*)', *Physiology and Behaviour* 46 (1990), 661–6.

⁴¹ See initially the list in Leone, *Gli animali da trasporto*, 15–39, with the caveat noted above.

⁴² See F. M. Abu Bakr, 'Horses in Ptolemaic Egypt in the light of the papyri', *BACPS* 7 (1991), 47–67. See also A. Leone, *Gli animali da lavoro da allevamento e gli ippoi nell'Egitto greco-romano e bizantino* (Naples, 1992), 172–6 for texts mentioning horses. Her lists in this second volume are again far from complete, and contain many errors. For the lack of use of horses in farm work, see the introductions to *P. Hamb.* I 9 and *BGU* XI 2049.

A letter written from an estate worker to his master in Oxyrhynchos implies that horses were generally thought of as riding animals, but that those of poor quality, or that were perhaps past their prime, could be used as pack animals.⁴³ Horses were, therefore, uneconomic as working animals, and were a luxury largely confined to the rich. For example, Strabo travelled south of Syene in a carriage, presumably drawn by horses, and a stable of horses and riding-donkeys was kept on the estate of the landowner Aurelius Appianus in the Fayum largely for the purposes of estate administration or the speedy collection of small items from estate units.⁴⁴ It seems not unusual to greet horses by name in private letters, which is an indication of how highly esteemed they were.⁴⁵ This esteem and importance clearly carries through into the realm of circuses and chariot racing, for which there is considerable evidence from Egypt—principally Alexandria, Antinoöpolis and Oxyrhynchos.⁴⁶ There was considerable interest in chariot racing which is traceable from the Ptolemaic period through to the late Roman, and there seems little doubt that the provision of horses for racing must have been profitable.⁴⁷ It is certain, however, that only the wealthiest landowners would be involved. It would be interesting to know if there was state involvement in the provision of horses, as in one papyrus from Oxyrhynchos, an individual complains of his appointment to the liturgy of administering military clothing, as he was ‘already a large breeder of horses’.⁴⁸ Horse breeding, therefore, seems to have been a liturgy, and while it may have been that these animals were destined for circus racing, it is equally possible that they were bred for the army. Our evidence falls short of being certain proof of either, and it

⁴³ *P. Oxy.* XVI 1858 (sixth or seventh century), part of an important group of documents relating to the estates of the Apion family.

⁴⁴ Strabo 17. 1. 50. D. W. Rathbone, *Economic Rationalism and Rural Society in Third Century AD Egypt* (Cambridge, 1991), 270–2. See *P. Laur.* II verso 13 for the purchase of a horse on the estate, possibly part of a breeding programme, implicit in Rathbone, *Economic Rationalism*, 274 n. 12 and at 368.

⁴⁵ See *P. Mich.* VIII 482 and IX 527.

⁴⁶ See J. Humphrey, *Roman Circuses: Arenas for Chariot Racing* (London, 1986), 505–20.

⁴⁷ Great interest in the sport is noted by Dio Chrysostom, *Orationes* 32. 40.

⁴⁸ *P. Oxy.* XVII 2110 (AD 370)—*μάλιστα νῦν ἵπποτ[ρ]όφου τυγχάνοντος μου.* On the *ἵπποτροφία* as a liturgy, see J. Gascoü, ‘Les institutions de l’hippodrome en Égypte byzantine’, *BIFAO* 76 (1976), 192–3.

may also have been the case that there were municipal benefactions expected of elites within Egyptian cities. There is clear evidence of this preserved in the municipal account of third-century Hermopolis, where an ex-magistrate details a personal contribution he has made to the horse races in the city.⁴⁹

Horses seem to have had little role in the economic life of Roman Egypt. They are mentioned in only three of over 900 customs-house receipts, and here the horses themselves are the items of trade—they appear once to have been used for transport.⁵⁰ The horses were exported from the Fayum through the customs station at Bacchias, but unfortunately their destination is unknown. It is likely that, given the location of Bacchias in the north-west Fayum, the horses were destined for sale in Memphis, or possibly at Alexandria for racing. The sale of horses generally was probably executed with a view to breeding; there are few contracts of sale, but most of what is preserved concerns the sale of mares, which could then be used for the breeding of horses or mules.⁵¹

The use of horses in a military capacity in Egypt has been well demonstrated, and there is every reason to believe that the supply of horses and other animals to the army followed the same procedures, perhaps with minor variations and accounting for local practices, that were found elsewhere in the Roman empire.⁵²

THE MULE

The use of mules as transport animals in Roman Italy is well attested, and it is reasonable to assume that they were used widely throughout the Western provinces of the Roman empire.⁵³ This is not true for

⁴⁹ *P. Ryl.* II 86 (AD 196). Similar benefactions are evidenced in *P. Oxy.* XXVII 2480 (AD 565/66), an account from the Apion estate for wine distributed to charioteers.

⁵⁰ *P. Wisc.* II 80, 103 = *P. Customs* 76 (AD 114) for two horses as items of trade; *SB* XII 10950 and 10951 = *P. Customs* 399 and 400, record the same transport operation.

⁵¹ See, for example, *PSI* IX 1031 (AD 134); *PSI* XIV 1405 (AD 134); *P. Ross. Georg.* II 18 LII; *LVI* (AD 140); *PSI* I 39 (AD 148); *P. Fay.* 301 (AD 167).

⁵² See generally, Davies, 'Supply of animals', esp. 154–8.

⁵³ There is a growing scholarly literature on the mule in the Roman world: see S. D. Martin, '*Servum Meum Mulionem Conduxisti*: mules, muleteers and

Egypt, where the mule's use was not widespread despite their hardy constitution, their adaptability to climate and load-bearing capacity, which is almost as great as the camel. Papyrological evidence for mules in Egypt is scanty. In the Ptolemaic period, Zenon, the manager of the estates of Apollonios the *dioicetes*, used them for transport purposes in both Palestine and Egypt.⁵⁴ In the Roman and Byzantine periods they appear performing farm work of various kinds and transporting imperial money and post.⁵⁵ Finally, in our assessment of other animals, we have considered custom-house receipts and animal figurines, and the mule's representation in these is as we would expect—no mention in customs receipts, and of 159 figurines, only five appear to be mules.⁵⁶

What we can say is that the use of mules was not common, but a pattern does emerge. Of the documents mentioning them being used for farm work, all come from the accounts of agricultural estates. This is significant because few ordinary farmers would have had either the animals required for breeding mules or the resources in cash to purchase them. In Italy at least, mules commanded large sums of money, and donkeys used for breeding mules could, according to Varro, be sold for 300 000 or 400 000 sesterces.⁵⁷ We have scant record of the price of mules in Egypt, but, as they were frequently more expensive than horses in Italy, it is likely that they were well beyond the reach of the ordinary Egyptian farmer.

That their use did not become common we can attribute to the well-established use of camels in desert regions and donkeys in the cultivated areas, and more importantly the difficulties and cost

transportation in classical Roman law', *TAPA* 120 (1990), 301–14; J. N. Adams, 'The generic use of *Mula* and the status and employment of female mules in the Roman world', *Rheinisches Museum für Philologie* 136 (1993), 35–61; and Laurence, *Roads of Roman Italy*, 123–35. On mules in military contexts on Trajan's Column, see J. C. N. Coulston, 'Transport and travel on the column of Trajan', in Adams and Laurence, *Travel and Geography*, 109–10, 112–13, and 115. On mules in Egypt, see briefly Schnebel, *Die Landwirtschaft*, 339, and Jördens, 'Sozialstrukturen', 87–8.

⁵⁴ *P. Lond.* VI 1930, 48 and 1973, 4 (both third century BC)

⁵⁵ For mules on the Appianus estate, see *SB VII* 9209; 9410; 9411 (third century); *P. Mich.* XI 620 (third century); *P. Lips.* 97 (AD 338); *Stud. Pal.* XX 85 (fourth century); for money and post, *P. Panop. Beatty* 2. 292–304 (AD 300), with, in general, Kolb, *Transport und Nachrichtentransfer*, 214.

⁵⁶ See Nachtergaele, 'Le chameau, l'âne et le mulet', 288.

⁵⁷ Varro, *De Re Rustica* 2. 8. 2–4.

of breeding mules—not easy in favourable circumstances, and even more difficult when horses were rare.⁵⁸ Indeed, the only clear evidence which exists for the breeding of mules is a seventh-century account listing disbursements of various kinds which is of little use, and, much more importantly, a late-third-century document addressed to a strategos in which he is asked to purchase mules for 10 silver talents each, presumably for military use.⁵⁹ As we shall see, the army often bought animals at what were presumably fixed prices. This opens up the important question of animal breeding which will be considered in more detail below.

We have evidence for the use of mules in a military context from the Chester Beatty papyri from Panopolis in Middle Egypt, in which a team of four mules with a carriage and driver carry military pay amounting to 33 talents and 500 denarii.⁶⁰ Also, a number of fourth-century memoranda mention a tax called the *χρυσὸς βουρδώνων*, which may represent payments for military annona.⁶¹ Although there is, as we have seen, some evidence for breeding for the army, given the probable size of stock even on large estates, this was certainly not as great in scale as evidenced in Italy, where the breeding of mules provided an important source of pack animals: Laurence envisages an industry which produced around 2800 animals per year.

OXEN

Although ubiquitous throughout the Mediterranean world, in Egypt oxen seem rarely to have been used for transport. As beasts of burden

⁵⁸ Despite Jördens, 'Sozialstrukturen', 88, who suggests the climate of Egypt favoured camels, and that this restricted the use of mules. It is more likely that the difficulties and expense of breeding mules restricted their use.

⁵⁹ *P. Oxy.* XVI 1919 (seventh century), with P. J. Sijpesteijn and A. E. Hanson, '*P. Oxy.* XVI 1919 and mule-breeding', *ZPE* 87 (1991), 268–74. *P. Oxy.* XIX 2228 (AD 283?).

⁶⁰ *P. Panop. Beatty* 2. 292–304 (AD 300).

⁶¹ H. C. Youtie, '*P. Mich. Inv.* 418 Verso: Tax Memoranda', *ZPE* 38 (1980), 285–6; with J. Lallemand, *L'administration civile de l'Égypte* (Bruxelles, 1964), 204–5; and most recently, F. Mitthof, *Annona Militaris: Die Heeresversorgung im spätantiken Ägypten: Ein Beitrag zur Verwaltungs- und Heeresgeschichte des Römischen Reiches im 3. bis 6. Jh. n. Chr.* (Florence, 2001), 196.

they are slow and cumbersome, are less adaptable to extremes of climate, which was obviously a restriction to their use in desert environments, and require much water and food. Indeed, oxen are much better suited to farm work of various kinds, such as ploughing and, especially important, for turning waterwheels (*sakiyeh*). A number of papyri record their use for this, and suggest that special harnesses were required.⁶²

The slowness of oxen, and their suitability to the tasks just mentioned may have actually served to make their use as transport animals uneconomical; it may have been simpler to use donkeys, or even hire them, than to remove oxen from their duties of draught.⁶³ Certainly this would serve to make them of little use to merchants or transporters, and indeed it is in documents relating to farming, principally on large estates, that oxen are most conspicuous. For example, a document from Euhemeria dating to the first century AD, from the archive of Lucius Bellenus Gemellus, contains instructions from Gemellus to his steward Epagathus to make sure that the ox-driver (*ζεφυγηλάτης*) keeps to his proper work of ploughing and hoeing.⁶⁴ Oxen were certainly used as transport animals on the third-century estate of Aurelius Appianus, but as camels and donkeys seem to have been more commonly used, it is likely that managers on the estate took advantage of oxen being redeployed on estate units to transport items.⁶⁵ As we shall see when we consider transport on agricultural estates in more detail, oxen and their drivers on the Appianus estate were small in number and were appointed to tasks around various units of this rather disparate estate by a centrally based administration. It seems that oxen were often used to pull carts, often carrying heavy and awkward items of farm equipment.

⁶² On the use of oxen for turning waterwheels, usually called a *μηχανή*, see especially *P. Flor.* I 16 (AD 239), with Schnebel, *Die Landwirtschaft*, 77–84 for additional references and discussion. Parallel texts are listed in the commentary to *P. Oxy.* XLIX 3511, an interesting private account which includes an entry for *ζεφυκη[ριών]* which the editor suspects refers to yoke-straps needed for oxen to draw a waterwheel.

⁶³ On this generally, see Sion, 'Quelques Problèmes', 631, where he states: 'La bête de somme est mieux adaptée à ces pays de relief multiple et raide, à leurs petites exploitations où elle est moins exigeante qu'un bon animal de trait.'

⁶⁴ *P. Fay.* 116 (AD 99).

⁶⁵ Rathbone, *Economic Rationalism*, 266–78.

The important factor to be borne in mind with this form of transport is that the speed with which it was performed was not ultimately of primary importance—all was for internal estate operations rather than external trade. The fact that the animals were available and that there was no pressure on time meant that they could be easily and expediently used. A fourth-century papyrus from Oxyrhynchos records the use of oxen for hauling stones (presumably on carts or wagons) on an estate owned by a woman named Clematia.⁶⁶ The circumstances are very similar to those of Lucius Gemellus, in that they are a set of instructions to a steward to use transport facilities at his disposal. Landowners used whatever animals they had at their disposal at any given time, rather than defining certain tasks as suitable for particular animals.

The unsuitability of oxen for use in extremely arid conditions is demonstrated, *ex silentio*, by their absence in the Eastern Desert. Oxen had long been used in the Mediterranean world for hauling building stone from quarries—largely for temple building and repair.⁶⁷ Probably due to the assumption that the use of oxen for such heavy transport was a commonplace, and to a lack of proper understanding of the problems of ancient harnessing systems, it was for some time thought that oxen were used in the quarries of the Eastern Desert—at Mons Claudianus and Mons Porphyrites.⁶⁸ This is not now considered to be the case. Faunal remains from Mons Claudianus have shown a complete absence of bovine remains in favour of donkeys and camels, while there is no mention of them in documents concerning transport in the desert.⁶⁹ It must have been the case that unsuitability to extremely arid climates and the higher cost of maintenance precluded the use of oxen in this region.

⁶⁶ *P. Oxy.* XLVIII 3407 (fourth century).

⁶⁷ See A. Burford, 'Heavy transport in classical antiquity', and ead., *The Greek Temple Builders at Epidaurus* (Liverpool, 1969), 184–91. Oxen were widely used in building programmes at Eleusis and Epidaurus.

⁶⁸ See especially T. Kraus and J. Röder, 'Voruntersuchungen am Mons Claudianus', *JdI* 77 (1962), 742, followed by R. Klemm and D. Klemm, 'Roches et exploitation de la pierres dans l'Égypte ancienne', in M. Waelkens (ed.), *Pierres Éternelles: Du Nil au Rhin. Carrières et Préfabrication* (Brussels, 1990), 36.

⁶⁹ Pers. comm. Marijke van der Veen.

WAGON USE IN ROMAN EGYPT

The use of wagons for the transport of bulky or heavy objects is of clear importance and has been the subject of some debate amongst scholars, both those specializing in the history of Egypt, and those considering transport in a broader sense.

It is commonly held that wagons enjoyed little use in Egypt as a whole. Johnson notes that 'transportation by land was usually by donkey or camel. Wagons were seldom used, although a tax found in Upper Egypt on wagons was paid by a private company engaged in transport, and some of the large estates used wagons for farm-work of various kinds.'⁷⁰ More recently, Richard Bulliet has argued that the camel *replaced* the wagon as a mode of transport in most of the Near East and North Africa during the Roman period, and at least by the time of the Arab conquest.⁷¹ Bulliet's theory is flawed, and is reached in ignorance of the papyrological evidence. Roger Bagnall, in response to Bulliet, and after comprehensive consideration of papyrus, argues cogently that the wagon did not disappear from Egypt, certainly not until after the seventh century.⁷² It is far from clear, however, that the wagon ever disappeared.⁷³ It is important to remember, and Bulliet does admit, that pack animals were always more common and widely used in Egypt than wagons. It is clear that donkeys were used extensively, and that the domestication and integration into the economy of the camel would have less to do with the lack of wagon use than other factors: the topography of Egypt and the high cost of wagon construction, not least due to the scarcity of timber in Egypt.

As we have seen, the topography of the Egyptian countryside had a profound effect upon land transportation, and thus must especially

⁷⁰ Johnson, 'Roman Egypt', 403.

⁷¹ Bulliet, *The Camel and the Wheel*, *passim*. Bulliet, 14, notes evidence cited by Johnson, and suggests that the disappearance of the wagon must have been subsequent to the first century AD, but that the process began before this time.

⁷² Bagnall, 'The camel, the wagon, and the donkey', 1-6.

⁷³ For Bulliet, at least, the argument rests on the tenuous argument *ex silentio*, that, as wagons are nowhere mentioned in the Geniza papyri from the Arab period, they had fallen out of use.

have been the case with wheeled transport. Indeed, the topography of Mediterranean countries more generally was ill-suited to the use of wagons.⁷⁴ It was probably the case, however, that wagons could easily be used upon the roads and tracks associated with irrigation channels and dykes, certainly on state roads, and on the major desert routes. Flat and easy terrain was the main requirement.⁷⁵ Other factors may have restricted use. While there is no good reason to suggest that inefficient harnessing prevented the use of wagons, what was probably more restrictive to their use was their high cost. We have no evidence for how much a wagon may have cost, but can be fairly certain that all but the most rudimentary wagons lay beyond the reach of ordinary farmers. Indeed, it is likely that wagons, as often was the case with pack animals, were hired or borrowed as required, rather than owned. It may therefore be no accident that our evidence for their use is mainly restricted to large estates. It is unlikely that ordinary farmers would have had either ready access to a suitable supply of timber, or to the skills and tools necessary to make wagon parts—especially wheels and axles.

The use of wagons in Egypt is not well documented. Our evidence is spread through a period of 11 centuries, from the early Ptolemaic period to the end of the seventh century AD. The majority of texts are from the first to fourth centuries AD, with most coming from the second, while we have a very small number from the sixth and seventh centuries.⁷⁶ Similarly problematic is the geographical spread of the documents. A large number come from the Thebaid and from the Fayum, with smaller numbers from the Oxyrhynchite, Panopolite and Hermopolite nomes. These patterns reflect the general sequence of preservation in the papyrological record.

We should at this stage distinguish between the different types of wagons, which probably had different uses. The most common word for wagon in the papyri is *ἄμαξα*, but other terms appear, such as *κάρνον*⁷⁷ and *κοπρευός*.⁷⁸ Our evidence suggests that *ἄμαξαι* were

⁷⁴ Sion, 'Quelques Problèmes', 631.

⁷⁵ Implied by Strabo 17. 1. 50.

⁷⁶ Bagnall, 'The camel, the wagon, and the donkey', 2–4.

⁷⁷ For example, *P. Flor.* II 140, 2 (third century). This term is widely used in the Heroninus archive, and perhaps refers to a four-wheeled wagon.

⁷⁸ For example, *P. Fay.* 119, 33 (c.100 AD), possibly used to describe manure carts.

used for carrying goods and provisions, heavy farm work and for more bulky loads such as stone, while other types of vehicle may have been used for lighter work. This is certainly the implication in an early-first-century AD papyrus from the Herakleopolite nome, which preserves a letter from an agent to Athenodoros, in which he claims that a wagon (ἄμαξα) had not been sent to collect a large load of timber.⁷⁹ In one third-century document, it seems that wagons might be designed for use with particular animals.⁸⁰ In the Eastern Desert, ostraca from Wadi Fawakhir and Mons Claudianus not only mention wagons which were used to carry provisions and for general transport tasks around the quarries and their satellites, but also a large 12-wheeled wagon is mentioned in a text from Mons Claudianus, which must have been used for the transport of stone blocks and columns.⁸¹ An interesting document from Oxyrhynchos, preserving a list of building materials, mentions stones cut specifically to be easily transportable by wagons—ἄμαξιαῖοι (wagon-stones), μικροὶ ἄμαξιαῖοι (small wagon-stones), and λίθοι μεγάλοι φορτιαῖοι (large portable stones).⁸² Additionally, a document dating to AD 300 shows beyond doubt that wagons were requisitioned for use in quarries.⁸³ It is certainly true that camels and donkeys, with their drivers, were kept year round at Mons Claudianus to perform tasks, such as carrying iron bars, water, and other necessities. The same may be true of the wagon-driver Kol, who seems to have been a familiar face at Mons Claudianus, and may have been a regular

⁷⁹ BGU XVI 2607 (AD 15)—the load was a large persea tree which was stored on what might be some sort of platform (πλατύμματος).

⁸⁰ BGU III 814.

⁸¹ *O. Fawakhir* 1 and *O. Claud.* I 177. For the 12-wheeled wagon, see C. E. P. Adams, 'Who bore the burden? The organization of stone transport in Roman Egypt', in D. Mattingly and J. Salmon (ed.), *Economies Beyond Agriculture in the Classical World* (London, 2001), 176 with previous references to this as yet unpublished text. No doubt this was a wagon of some size and complexity. There is evidence for heavy-duty wagons from late antique Egypt, see *P. Cairo Masp.* III 67303 (AD 553), and for wagon construction in *Tab. Vindol.* II 309, which records the delivery of wagon parts (34 hubs, 38 axles, 1 axle turned on a lathe, and 300 spokes) presumably for construction at the fort. On wagon construction in the Roman period, see H. Chapman, 'Roman vehicle construction in the north-west provinces', in S. McGrail (ed.), *Woodworking before AD 1500* (Greenwich, 1982), 187–93.

⁸² *P. Oxy.* XXXI 2581 (third century).

⁸³ *P. Panop. Beatty* 2. 153–5 (AD 300).

transporter (*O. Claud.* I 177), and the occupation of *ἀμαξεύς* (wagon-driver) is attested in a number of unpublished ostraca.

The well-known Koptos Tariff inscription records the charges made for the use of roads between Koptos and the Red Sea coast. A charge of 4 drachmas (12 times that for a donkey) was made for a pass (*πιττάκιον*) enabling one to use wagons on the desert routes. The important implication of this is that civilian transporters must have used wagons for transport in this region. It is certain that wagons were used in the imperially owned quarries, but these state transporters would not have had to pay transit tolls or duties, as we know from an edict of Hadrian that those engaged in state business did not have to pay duties.⁸⁴ Private transporters, therefore, must have been operating; and we have some evidence for this.

From the Ptolemaic period, one ostrakon preserves information on the use of wagons in Eastern Desert caravans.⁸⁵ From the Roman period, we have a number of receipts preserved on ostraca for a tax on wagons—the *τέλος ἀμαξῶν*.⁸⁶ All come from the Thebaid; it is possible that this is an accident of preservation, but more likely that the tax was a local variation or phenomenon. The most important of these record a series of payments made by an individual named Cametis and his associates, who appear to have made up a company of transporters.⁸⁷ They pay a large amount for this tax, which must mean, as the tax was levied on the possession of wagons, that they owned a large number. There is the possibility also that this was a trade tax, and that payment of this tax was only necessary if the wagons were available for private hire or were used for the purposes of trade. A papyrus from the Oxyrhynchite nome preserves a registration of two donkeys with the state, in which the owner states where they are kept and, more importantly, that they are employed in his own work.⁸⁸ Another text is even more specific, and implies that animals engaged in other work or that were hired out were subject to a different

⁸⁴ *Dig.* XXXIX 4.9.7–8 [Paulus]; *Dig.* XLIX 14.6.1 [Ulpianus].

⁸⁵ *O. Oslo* 2 (third or second century BC).

⁸⁶ *WO* II 392; 395; 1054; 1057; and 1261.

⁸⁷ *WO* II 392 and 395 (AD 44–5 and 45–6).

⁸⁸ *P. Oxy.* XII 1457 (4–3 BC), 12–13: *ἐργαζομένας μου τὰ ἴδια ἔργα*.

rate of tax.⁸⁹ The details of taxation for transport and of transport companies will be considered more fully below, it is sufficient at this stage to conclude that these ostraca show that wagons were an important feature of transport in the Eastern Desert, but that they never undermined the dominant role of pack animals. Ultimately, use of wagons was determined by terrain and by what they carried.

⁸⁹ SBI 4516: *μη ἐργαζομένο(υς) μισθοῦ ἀλλ' εἰς ἰδίαν χρεΐαν.*

4

Animal Use and Maintenance

Now that we have established the evidence for transport animals in Roman Egypt, it remains to consider further the uses to which they were generally put and their maintenance requirements.

All transport animals were used for farm work of various kinds. Donkeys and camels were used extensively for the short and long-distance transport of staple foodstuffs for both government and private consumption and sale. This much is clear, but a number of points need discussion: the size of animal loads, methods of carrying them, and the costs and considerations of maintenance. We must also take into account the closely interdependent nature of different forms of transport: 'the pack-saddle competes with the harness, bovine with equine traction. River and coastwise transport and human portage restrict the role of animals. In proportion as a particular technique is better adapted to geographic conditions, and is able to move goods at a lower price, it pushes other methods into the background.'¹

ANIMAL USE

From Pharaonic tomb paintings and terracotta figurines, we have iconographic representation of everyday transport scenes.² Such a picture

¹ White, *Farm Equipment*, 219, citing P. Vigneron, *Le Cheval dans l'antiquité gréco-romaine*, 140.

² Nachtergaeel 'Le Chameau, l'âne et le mulet'. From the Graeco-Roman period, the wall paintings from the Wardian Tomb provide evidence for animal use with irrigation devices, and crude paintings from Soknopaiou Nesos depict pack animals

is difficult to reconstruct from the papyrological record, but enough remains for us to have a good impression of animal use. Useful comparison, perhaps, can be made with transport in contemporary rural Egypt. The transformation effected by modern transport is obvious, but often does not affect a peasant cultivator in the modern Fayum, who still relies on donkeys, and in some cases camels, to perform tasks which reflect vividly those performed two thousand years ago. One historian of agriculture in Medieval Egypt has stated that 'the Medieval Egyptian peasant used the same tools which were known and used in the Pharaonic period and are still used by the modern *fellah* without much alteration'.³ In other parts of the world, for example Rajasthan in India, North Africa, and other developing countries of the Near East, it is possible to gain some impression of how animals may have been utilized. In many cases, modern harnessing is still not used, rather crude harnesses of rope and wood being common.

In tomb paintings from the Pharaonic period, donkeys are frequently depicted in rural scenes, both in herds and in use as beasts of burden. They were used for a multitude of different purposes from carrying and threshing corn, to transporting minerals and ores in the desert regions and for long-distance transport. Often they were used as riding animals, but it was as working animals that they were important.⁴ Throughout the Pharaonic and Ptolemaic periods, the donkey was by far the most important transport animal. Camels, as we have seen, may have been introduced into Egypt as early as 1000 BC, but did not play a significant role in the economy of Egypt until the Roman period.

In the Roman period, donkeys were used for a variety of purposes. There exist from this period a number of quite extensive documents

and a wagon. See M. S. Venit, 'The Painted Tomb from Wardian and the decoration of Alexandrian Tombs', *JARCE* 25 (1988), 71–91, and more generally, ead., *Monumental Tombs from Alexandria: The Theater of the Dead* (Cambridge, 2002); A. E. R. Boak (ed.), *Soknopaiou Nesos: The University of Michigan Excavations at Dimê in 1931–32* (Ann Arbor, 1935), Plate IV.

³ H. Rabie, 'Some technical aspects of agriculture in medieval Egypt', in A. L. Udovitch (ed.), *The Islamic Middle East, 700–1900: Studies in Economic and Social History* (Princeton, 1981), 63, quoted by A. K. Bowman and E. Rogan (ed.), *Agriculture in Egypt from Pharaonic to Modern Times* (Oxford, 1999), 5–6.

⁴ See generally, Partridge, *Transport in Ancient Egypt*.

preserving farm accounts, which often record the uses to which animals could be put.⁵ Perhaps the best example is the accounts of the first-century estate of Epimachos in the Hermopolite nome.⁶ Here we find donkeys used for carrying manure, pigeon dung, sebakh, reeds and rushes, sheaves, and bricks. Similarly, on the third-century estate of Valerius Titanianus, for which accounts are preserved, pebbles, sand, wheat, straw and rope are carried.⁷ It seems that the estate animals were used, as we would expect, for the transport of any commodity, and that these operations would be carried out in conjunction with other forms of transport available—usually wagons and teams of oxen.⁸ Cattle, although quite rarely attested in the papyri, seem also to have been used for transport purposes on large estates, and especially for threshing grain, but never as pack animals for they can carry little on their backs.

Although camels are thought to be used solely for commercial or long-distance transport, there is good evidence that they too were used on estates as necessary.⁹ We shall consider the role of animals on the estate of Aurelius Appianus and Valerius Titanianus in greater detail below, but at this point we should note that camels, like donkeys, were also used for many different purposes. A papyrus from the Arsinoite nome records the use of camels for harvesting and carrying hay, and for transporting sheaves.¹⁰ In a third-century papyrus from Memphis, accounts for a large estate record that 50 camels were used for carrying clay for the repair of

⁵ Transport on estates will be considered in more detail below. A selection of farm accounts has been gathered by Johnson, 'Roman Egypt', 174–228. Important additions to these documents are *P. Mich.* XI 620 and the Heroninus Archive, discussed at length by Rathbone, *Economic Rationalism*. There is good evidence also in the archive of documents relating to the family of the descendants of Laches, see W. S. Bagnall, *The Archive of Laches: Prosperous Farmers of the Fayum in the Second Century* (Ann Arbor, 1974).

⁶ *P. Lond.* I 131 recto (AD 78/9).

⁷ *P. Mich.* XI 620 (AD 239–40).

⁸ For a brief survey, see Schnebel, *Die Landwirtschaft*, 337.

⁹ Schnebel, *Die Landwirtschaft*, 334.

¹⁰ *P. Ups. Frid.* 10 (AD 250–300), possibly from the Appianus estate. The editor translates the verb *δραγματηγέω* as 'hauling sheaves', but the word is neutral (usually translated as 'convey'), and it seems reasonable to suggest that they were carried (as they often are still) on the animal's back, even if we might expect some form of *δραγματηφόρος*. Camels also appear transporting sheaves in *BGU* III 921 (second century) from the Fayum.

embankments.¹¹ Reliefs from Roman Tripolitania show the use of camels in similar farm work, such as ploughing and carrying agricultural produce.¹² While camels were certainly used for farm work, usually on large estates which could afford to maintain these expensive animals, donkeys are likely to have been the most important and widely used transport animals in the context of farming. For long-distance and desert transport, however, the camel was supreme.

Camels were primarily used as pack animals in desert environs, where they were able to cover large distances carrying heavy and awkward loads. They could also be used as draught animals, and evidence suggests that they were used as such in the Eastern Desert. Camels played an important role in the quarrying operations at Mons Claudianus and Mons Porphyrites, where they not only hauled stone columns, but were used to support work in the quarries by carrying water, iron bars, and other essential supplies.¹³ They seem to have been used commonly in quarries near Oxyrhynchos, which is suggested by the term *καμηλίκος* used to describe particular sizes of stone block cut so as to be easily transportable by camel.¹⁴ The reliefs from Tripolitania mentioned above, together with the evidence from terracotta figurines, suggest that camels were harnessed with a withers strap in much the same way in the Roman period as they are in modern Tunisia, where they are still used for draught.¹⁵ Indeed, the relative advantages of camels over oxen as draught animals have been accepted for some time: they can carry or draw twice as much weight, are faster and able to cover greater distances over difficult terrain, they live and work four times longer, cost less to maintain, and have greater powers of abstinence from food and water.¹⁶ This, together with the total lack of evidence for the use of oxen in desert regions, is a compelling argument for the use of camels as draught animals.

¹¹ *BGUI* 14 col. 3 (AD 255). As we shall see, the large number of animals involved is not inconsistent with what is found on other estates, imperial or private, in the third century.

¹² See O. Brogan, 'The camel in Roman Tripolitania', *PBSR* 22 (1954), 126–31, and briefly in D. Mattingly, *Tripolitania* (London, 1995), 178.

¹³ See below, Chapter 9.

¹⁴ *P. Oxy.* III 498 (second century).

¹⁵ Bulliet, *The Camel and the Wheel*, 195–6.

¹⁶ A. G. L. Leonard, *The Camel* (London, 1894), 329–30.

ANIMAL HARNESSING

The nature and efficiency of animal harnessing in Egypt, and the ancient world generally, is a perplexing problem.¹⁷ References in the papyri to items of harnessing are rare, and this problem is exacerbated by the difficulties in reconciling the terms used on these documents with depictions of harnesses on reliefs or figurines and how they might have been used in practice.¹⁸ Archaeological evidence for animal harnessing is even more meagre. Some items of harnessing are on display in the Cairo Museum, found during excavations at Karanis in the Fayum. These include crude animal collars of wood, with holes through which strapping could have been threaded, and pack-saddles made of wood and palm-fibre rope. Unfortunately, these artefacts are difficult to access, often do not have inventory numbers, and more seriously, have not been described in archaeological reports. Recent excavations at Berenike on the Red Sea coast have turned up small quantities of cordage and basketry. The basketry fragments are probably from bags used to carry supplies to Berenike from the Nile Valley.¹⁹

¹⁷ The most recent discussion is G. Raepsaet, *Attelages et techniques de transport dans le monde gréco-romaine* (Brussels, 2002). See also, White, *Farm Equipment*, 56–9.

¹⁸ See K. Vandorpe, ‘“When a man has found a horse to his mind”: On Greek horsemanship in the Ptolemaic period’, *Akten des 21. Internationalen Papyrologenkongresses. Berlin 13.–19.8.1995* (Stuttgart and Leipzig, 1997) iii 984–90, which compares our information about animal harnessing comes from military contexts in the Western empire, see C. van Driel-Murray, ‘The production and supply of military leatherwork in the first and second centuries AD’, in M. C. Bishop (ed.), *The Production and Distribution of Roman Military Equipment: Proceedings of the Second Roman Military Equipment Research Seminar* (Oxford, 1985), 43–75. On horse saddles and equipment found in Nubian tombs, see W. B. Emery, *Nubian Treasure: An Account of the Discoveries at Ballana and Qustul* (London, 1948), 47–9, and on horses depicted on Trajan’s column, see Coulston, ‘Transport and travel on the column of Trajan’. For camel saddles, see E. R. Knauer, *The Camel’s Load in Life and Death* (Zurich, 1998) 44–69.

¹⁹ See the archaeological reports: S. E. Sidebotham and W. Z. Wendrich (ed.), *Berenike 1994: Report of the 1994 Excavations at Berenike (Egyptian Red Sea Coast) and the Survey of the Egyptian Eastern Desert* (Leiden, CNWS, 1995), 69–84, id., *Berenike 1995: Report of the 1995 Excavations at Berenike (Egyptian Red Sea Coast) and the Survey of the Egyptian Eastern Desert* (Leiden, CNWS, 1996), 289–96. Most of our information about animal harnessing comes from military contexts in the Western empire, see C. van Driel-Murray, ‘The production and supply of military leatherwork in the first and second centuries AD’, in M. C. Bishop (ed.), *The Production and Distribution of Roman Military Equipment: Proceedings of the Second Roman Military Equipment Research Seminar* (Oxford, 1985), 43–75. On horse saddles and equipment found in Nubian tombs, see W. B. Emery, *Nubian Treasure: An Account of the Discoveries at Ballana and Qustul* (London, 1948), 47–9, and on horses depicted on Trajan’s column, see Coulston, ‘Transport and travel on the column of Trajan’. For camel saddles, see E. R. Knauer, *The Camel’s Load in Life and Death* (Zurich, 1998) 44–69.

Little information of any significance can be derived from the archaeological record, so we must turn to papyri. As noted above, references to animal harnessing are rare: seven from the Ptolemaic period, and nine from the Roman.²⁰ There are many difficulties with the Greek terms used to describe harnessing, which are often vague, have syntactic variations or morphological changes, or are simply unknown words.

Several terms for various items of tack find their way into the papyrological record.²¹ A saddle (*ἀστράβη*)²² was cushioned with a cloth (*κάγη*),²³ in order to prevent chafing on the body of the animal, and this latter term was often used to describe a saddle. Camels were also fitted with cloths.²⁴ Saddles could be made of leather or cloth, and may sometimes have had a wooden frame, as they do in modern rural contexts. Various straps (*κανδάλιον*)²⁵ connected with halters (*φορβηάς*) or bridles (*τριβόλους*),²⁶ joined the harnessing together, and allowed the animal to be ridden. Finally, saddlebags could be attached to the harnessing, and these are referred to variously. The usual term (*δικάκκιον*) is often qualified by an adjective describing the material from which they were made, which could be leather,²⁷ or hair.²⁸ Panniers (*σαργάνη*) may have

²⁰ Ptolemaic: *P. Cairo Zen.* IV 59659; 59781; and 59782 (third century BC); *P. Hib.* II 211 (c.250 BC); *P. Tebt.* III.2 886 (182 BC?); *P. Lond.* II 402 (152 or 141 BC); and *P. Tebt.* I 38 (second century BC). Roman: *SB XIII* 11017 (AD 12); *P. Oxy.* II 326 = *SB X* 10241 (first century); *P. Oxy.* LI 3642 (second century); *P. Oxy.* IV 741 (second or third century); *P. Mich.* IX 576; *P. Mich.* XV 717; *P. Oxy.* XXXI 2598 (all third century); *P. Col.* VII 188; and *P. Oxy.* LVI 3869 (sixth or seventh century).

²¹ Some are discussed in Vandorpe, 'When a man has found a horse'.

²² *P. Cairo Zenon* IV 59659 (third century BC).

²³ *P. Mich.* XV 717 (third century). See also *SB VI* 9150, with B. Neilsen and K. Worp, 'New papyri from the New York University collection: I', *ZPE* 133 (2000), 173–6, with n. 1.37. In addition to a saddle cloth (*κάγη*) this text mentions *ἀργαλεί* (read *ἐργαλεία*)—'tools'—which may mean harnessing of some type.

²⁴ *P. Mich.* XV 717—*χαγὴν τῆς καμήλου*. See Nachtergaele, 'Le chameau, l'âne et le mulet', 305, figs 2 and 3, for saddled camels, and 316–17, with figs 8–11 for camel panniers.

²⁵ *P. Oxy.* IV 741 (second century). *LSJ* has 'horseshoe' under this reference, which should be updated.

²⁶ *P. Mich.* XV 717 (third century).

²⁷ *P. Mich.* IX 576 (third century).

²⁸ *P. Col.* VII 188 (AD 320). On the use of the feminine *δικάκκια*, see G. Husson, 'TO ΔΙΣΑΚΚΙΟΝ/Η ΔΙΣΑΚΚΙΑ: formes concurrentes du genre féminin parallèles aux neutres en -ιον', *Atti del XVII. Congresso Internazionale di Papyrologia* (Naples, 1984) iii 1297–301.

been different in design, and were often conical in shape (κανθήλια).²⁹ From the evidence of terracotta figurines, and from modern practice, we can assume that these saddlebags were slung over the animal, one or two on each side to balance the load. Sacks could also be arranged on top of the animal's saddle, especially if it was constructed from a supporting wooden frame.³⁰

The effectiveness of ancient animal-harnessing in draught has been an area of considerable scholarly debate since the survey of Lefebvre des Noëttes.³¹ He argued that, due to inefficient harnessing, a team of two horses could not have pulled more than 500 kg because harnessing systems impaired the breathing of animals, thereby greatly reducing tractive power.³² The thesis is based on his interpretation of the Theodosian Code of AD 438, which stipulated that maximum loads to be carried by wagons of the *Cursus Publicus* were not to exceed 500 kg.³³ This is not evidence, however, for the inefficiency of harnessing, but merely of state concern at abuses within the *Cursus Publicus*. If the state was concerned with regulating weights drawn due to poor harnessing, some attempt would have been made to stipulate the gaits used, as 'drawing force increases in proportion to rising speed'.³⁴

Tractive efficiency, however, does not depend solely upon the form of harness, but on the strength and weight of the draught animal and the nature of the cart. In recent experiments it has been shown that good traction could be obtained using a yoke harness with loads of

²⁹ O. Claud. II 276 (second century). See H. C. Youtie, 'Short texts on papyrus', *ZPE* 37 (1980), 211 = *Scriptiunculae Posteriores* ii 575, on the *καργάνη* and the *κόφινος*.

³⁰ Nachtergaele, 'Le chameau, l'âne et le mulet', 323, fig. 12 for a sack tied to a pack animal, and 310, fig. 7, for a wooden frame for attaching loads to a camel. The Greek *σάκκος* meaning a sack, is a term which turns up frequently in papyri, but tends to represent sacks carried by men, often called *σακκοφόροι*.

³¹ C. Lefebvre des Noëttes, *L'Attelage*, (Paris, 1931) with the review by Sion. See also White, *Roman Farming*, 219–20. See most recently, Raepsaet, *Attelages et techniques*.

³² Lefebvre des Noëttes, *L'Attelage*, 164.

³³ *Cod. Theod.* 8. 5. 30; Lefebvre des Noëttes, *L'Attelage*, 157–62.

³⁴ J. Spruytte, *Early Harness Systems: Experimental Studies: Contribution to the Study of the Horse* (London, 1983), 123. If harnesses had a strangling effect, animals would have increasing difficulty in breathing as they increased speed or were travelling uphill.

up to 1000 kg.³⁵ As early as the second millennium BC, yoke harnessing had been adapted to make it more suitable for equine anatomy by using saddle legs, which had the effect of transferring some pressure onto the shoulders of the animal. If inefficient traction was a problem, of which I am not convinced, for Spruytte it was due, not to poor harnessing, but to the lack of knowledge of the fact that pulling power depends on the relative weight of animals to the load. The nature of the vehicle pulled also had an effect. The use of wooden axles was not restrictive to small wagons or chariots using thin axles, and on larger wagons the larger the wheels, the less the frictional resistance.³⁶ On hard ground, large wagons with large wheels are easy to move, so the surface on which heavy transport takes place is probably much more important than harnessing.³⁷ Ultimately, the efficiency of ancient harnessing has been underestimated, and the thesis of Lefebvre des Noëttes has now been discredited. In the Graeco-Roman period, animals could and were used to pull heavy loads and there was no reason to resort to human traction.³⁸

ANIMAL LOAD-BEARING CAPACITY

One important consideration in the use of animals for transport is their load-bearing capacity. The detail offered here supplements previous metrological work; such issues are crucial to the interpretation of much papyrological evidence. The issue of whether there was a 'normal' load for an animal or wagon in Egypt was first addressed by Wilcken in his magisterial study of Greek ostraca.

³⁵ Spruytte, *Early Harness Systems*, 98–125. See also M. A. Littauer and J. H. Crowell, *Wheeled Vehicles and Ridden Animals in the Ancient Near East* (Leiden, 1979), 28–31, and esp. on Lefebvre des Noëttes, 29 n. 67.

³⁶ B. Cotterell and J. Kaminga, *Mechanics of Pre-industrial Technology* (Cambridge, 1990), 198, who note that this was known in fourth-century Greece, as it is mentioned in the Aristotelian *Mechanical Problems*. See also Spruytte, *Early Harnessing Systems*, 105.

³⁷ Cotterell and Kaminga, *Mechanics*, 203.

³⁸ This is clearly demonstrated in Greece by temple-building operations at Epidauros and Eleusis, see Burford, *The Greek Temple Builders at Epidauros*, 184–91. For Egypt, see Adams, 'Who bore the burden?'

He concluded that the normal load for a donkey was 1 sack of 3 artabas, and that of a wagon 5 or 6 artabas.³⁹ This is still commonly held to be the usual load for a donkey, but, of course there are complications to this. In a large number of transport receipts and memoranda, the Greek *ὄνος* (donkey) seems to be used to describe the load carried and appears to represent a unit of measure.⁴⁰ But it is wrong to consider donkey loads as reliable metrological evidence: 'the loads carried by any particular donkey or any group of donkeys might depart widely from this normal or ideal load'.⁴¹ To take two examples: in *P. Harr.* I 93 (AD 294) a group of donkeys carries a series of loads of 4 artabas in 2 sacks, the loads presumably being balanced on each side of the animal, and in *BGU* III 802 (AD 42) loads of 3.5 artabas are carried. It is likely that the *sitologoi* or other officials in charge of loading the animal knew exactly what was contained in each load in artabas, and that, after measurement, loads were merely apportioned to animals in the most efficient and least time-consuming manner, according to the number of animals available and the distance to be travelled. Ultimately, 'the terrain traversed, the length of the haul, or the condition of the animals might in any instance influence the amount which could be carried with most efficiency'.⁴² Within the context of state transport of grain and other staple goods, we should consider donkey loads not as units of measure per se, but representative of an official method of recording the use of animals to transport whole consignments of produce in the most efficient manner.

For small-scale private transport, we are lucky in that we possess over 900 customs-house receipts from the Fayum.⁴³ A recent study of

³⁹ Wilcken, *Ostraka*, 754–5. He does not consider the normal load for a camel.

⁴⁰ Many of the Fayum transport memoranda use *ὄνοι* as units of measure. Occasionally 'half-donkeys' appear—*ὄν(ον) ἕνα ἡμίονον*—see *O. Oslo* 50; *O. Mich.* I 421; 422; 530; and 543. This would certainly seem to indicate a unit of measure. On these texts, see most recently F. Reiter, 'Vorschläge zu Lesung und Deutung einiger Transportbescheinigungen', *ZPE* 134 (2001), 191–207.

⁴¹ O. M. Pearl, 'Varia papyrologica', *TAPA* 71 (1940), 380, supported by H. C. Youtie, 'Diplomatic notes on Michigan ostraca', *Classical Philology* 39 (1944), 28–39, = *Scriptunculae* ii 830–41.

⁴² Pearl, 'Varia papyrologica', 381.

⁴³ Conveniently gathered in P. J. Sijpesteijn, *Customs Duties in Graeco-Roman Egypt* (Zutphen, 1987).

animal loads recorded within this body of documents has shown that while there is no established 'normal' load, there were load sizes which were favoured, which may be a good indication of what maximum loads may have been.⁴⁴ Habermann considered the size of loads for wheat, oil, and wine, the three most commonly attested commodities. For a 'dry' artaba of wheat he found that by far the most common load for a camel was 6 artabas (94.28 per cent); for a camel foal, 4 artabas was the usual load (88.03 per cent). For donkey loads there is more variation. The most common load was 3 artabas (45.03 per cent), but 2 and 4 artabas were frequently carried (19.21 per cent and 27.82 per cent respectively).⁴⁵ If we consider the size of loads in the context of the geographical position of the villages where the animals are attested, an interesting pattern emerges. At Soknopaiou Nesos in the north-west Fayum 65.63 per cent of donkey loads were 3 artabas, 31.25 per cent were 2 artabas, and 3.12 per cent were 4 artabas. A different pattern can be seen at Bakkhias and Philadelphia in the north-east Fayum, where loads of 4 artabas are much more common (38.98 per cent and 33.33 per cent respectively). These very basic statistics are based on the number of attested cases, but if we consider the load carried by each animal, similar results apply: 70.45 per cent of donkeys at Soknopaiou Nesos carry 3 artabas, 41.49 per cent and 38.30 per cent of donkeys at Bakkhias carry 3 and 4 artabas respectively, and 25.45 per cent and 40 per cent at Philadelphia carry 4 and 5 artabas. Ultimately, the size of loads carried by donkeys increased the shorter the distance travelled, by as much as one-third on journeys under 15 km.⁴⁶ Load size variations for camel loads cannot be tested to the same extent, as camels are less often attested in the eastern Fayum.

These figures confirm that the length of journey affected the size of load carried by an animal. Animals travelling through Soknopaiou Nesos were travelling to and from the Small Oasis, and were traversing

⁴⁴ W. Habermann, 'Statistische Datenanalyse an den Zolldokumenten des Arsinoites aus römischer Zeit', in H.-J. Drexhage and J. Sunskes (ed.), *Migratio et Commutatio: Studien zur Alten Geschichte und deren Nachleben, Festschrift Thomas Pekàry* (St. Katharinen, 1989), 157–75, and id., 'Statistische Datenanalyse an den Zolldokumenten des Arsinoites aus römischer Zeit II', *MBAH* 9 (1990), 50–94.

⁴⁵ Habermann, 'Statistische Datenanalyse II', 60–1.

⁴⁶ Habermann, 'Statistische Datenanalyse II', 62–5.

much longer distances than those donkeys carrying loads in the eastern Fayum along shorter Nile Valley routes.

In the case of oil and wine, the size of loads varied considerably. Camels carried 4–4.5 metretai of oil in 94 per cent of cases, their foals usually carried 3. The ‘normal’ load for a donkey has usually been held to be 2.25 metretai. Pearl, however, has noted that it is wrong to suggest that a donkey load can be assumed to be of a specific size, and the customs receipts show that with loads of oil, as with wheat, there was a great variation in load size.⁴⁷ Similarly, with wine, the usual load appears to have been 4 keramia, but in practice there were many exceptions to this: for example, 3 camels carrying 16 keramia,⁴⁸ 2 camels carrying 6 keramia each,⁴⁹ and 28 keramia carried by 5 donkeys.⁵⁰

Camels are able to carry considerably more than donkeys or horses, indeed particularly strong camels can carry up to 800 lbs, but only for short distances.⁵¹ While the arch of a camel’s back provides greater load bearing capacity, the camel is limited by the weight with which it can rise to its feet. According to the *Edict of Maximum Prices* (17.4), the normal load for a camel was 600 Roman lbs. Their normal load in the Fayum customs-house receipts is 6 artabas (double the standard 3 artabas for donkeys).⁵² The size and weight of an artaba varied, but one artaba probably weighed a little over 60 lbs, making a normal load some 400 lbs, which seems a reasonable average and agrees nicely with the 600 Roman lbs mentioned in Diocletian’s edict (c.430 lbs).⁵³ Like donkey loads, the size and weight of camel loads could vary—one load of 10 artabas

⁴⁷ For the ‘normal’ measure, see A. Segrè, *Metrologia e circolazione monetaria degli antichi* (Bologna, 1928), 30, followed by Sijpesteijn, *Customs Duties*, 53, who fails to note that Pearl, ‘Varia papyrologica’, 380–2 proved Segrè’s findings wrong. See most recently, P. Mayerson, ‘Measures (μετρηταί) and donkeyloads of oil in *P. Wisc.* II. 80’, *ZPE* 127 (1999), 189–92.

⁴⁸ *BGU* XIII 2310 = *P. Customs* 199 (AD 145).

⁴⁹ *P. Heid.* III 241 = *P. Customs* 349 (AD 211).

⁵⁰ *P. Fay.* 73 (second or third century).

⁵¹ Diodorus Siculus 2. 54. 6 that some camels could carry up to 900 lbs of wheat. See Gaultier-Pilters and Dagg, *The Camel*, 109–10, where they note that modern nomads give camels loads of 150 kg, perhaps up to 300 kg for short distances. The French and British Camel Corps had weight limits of 150 and 200 kg respectively. See also, Bulliet, *The Camel and the Wheel*, 20.

⁵² *P. Grenf.* II 50 (b) = *P. Customs* 197, where two camels carry 20 artabas of wheat is clearly an exception, and the journey must have been short.

⁵³ See Rathbone, ‘The weight and measurement of Egyptian grains’, 165–75.

is recorded in one customs receipt.⁵⁴ Later sources confirm these weights: in the Cairo Geniza papers, camels appear carrying 450–600 lbs weight.⁵⁵

We can only conclude that the size of animal loads varied considerably, sometimes due to geographical and topographical factors or the distance travelled, but also due to factors that cannot be established from our evidence—the strength of the animal or the nature of its saddle or harnessing. Ultimately, decisions on the size of animal loads were taken by transporters according to the individual requirements of each journey.⁵⁶

As far as wagon-loads are concerned, our evidence is meagre. Wagons were not used for the transport of state grain, so there can have been no regulation of the size of loads in artabas by the state. The *Edict of Maximum Prices* sets the size of a wagon-load at 1200 Roman lbs, twice that carried by a camel.⁵⁷ No doubt the lighter wagons used for farm work, such as transporting sheaves, were much lighter in frame than those used for carrying military supplies, heavy loads of grain, and supplies for the stations in the Eastern Desert. The weight that wagons could carry was dictated not only by the strength of the wagon, but also the surface upon which it travelled. Thus heavier wagons were unlikely to have been used in heavily irrigated landscapes, but rather on well defined roads such as those of the Eastern Desert. The roads of the Nile Valley, even those of the *Cursus Publicus*, were probably more suited to pack animals, as were the routes of the Western Desert.

⁵⁴ *P. Customs* 197.

⁵⁵ See Goitein, *A Mediterranean Society* i, 215–16.

⁵⁶ For more modern comparisons, see D. R. Ringrose, *Transportation and Economic Stagnation in Spain 1750–1850* (Durham, N.C., 1970), 43–6. In eighteenth and nineteenth-century Spain it seems the size of animals was the determining factor in load-bearing capacity, and the few references in Ringrose's evidence allow quantification in only a very small number of cases. Ultimately it can be said only that small animals carried two-thirds the load of larger. In modern Greece, a rule of thumb is that on steep ground donkeys carry 50 *οκάδες* (63.5 kg) (pers. comm. Hamish Forbes). The usual load in Roman Egypt was 3 artabas (c.80 kg), so terrain was the governing factor in the weight of animal loads.

⁵⁷ *Ed. Diocl.* 17. 3–5. On the size of wagon-loads in the Byzantine period, see W. Hengstenberg, 'Die griechische-koptischen *μολλον*-Ostraka', *ZAS* 66 (1931), 51–68 and E. Schilbach, *Byzantinische Metrologie* (Munich, 1970), 17.

GENERAL TRANSPORT CAPACITY

Now that we have established the carrying capacity of individual animals, something should be said about estimating the volume of goods that could be transported. We cannot expect to find evidence quantifying the volume of goods transportable—such information, if it ever existed (and this must be doubted), would have been kept in Alexandria. Neither is it common in the evidence we do possess for exact details of the scale and nature of any transport operation to be recorded, thus it is difficult to move beyond this to estimate the transport capacity of individuals, communities or regions. At the risk of anticipating some of what follows, it seems relevant here to make some observations on the capacity of transporters and transport operations based on what can be retrieved from the papyri.

Put simply, transport operations could be small or large depending on demand. The everyday needs of a farmer were different from those of the state, which might need to transport large amounts of goods quickly. Individual farmers, as we shall see, could develop strategies to cope with their transport demands, which included the hire of animals at busy periods of the agricultural year. In this way, nearly all demands and contingencies could be met. Professional transporters could take on work according to their resources, both the number of animals they owned and the manpower available. As we shall see, transporters could act singly, and would then clearly be limited by what their animals could carry, or in what we might call companies, such as that of Nikanor. It is estimated below that he and his family may have owned as many as 30 camels, which in a single venture could have carried some 180 artabas of grain. On the basis that his animals could undertake two journeys between Koptos and Myos Hormos in a month, we could suggest then that they could transport c.360 artabas per month. We should bear in mind also that they would certainly want to engage a similar load in other commodities on each return journey. These speculative figures give some notion of scale. The quantities may seem small in comparison to the carrying capacity of ships, but this is a considerable amount, and land transport was the only option in the desert. It is also possible to estimate the transport requirements for supplying the

quarries of the Eastern Desert, where as much as 900 artabas of wheat per month would have been required.⁵⁸ Larger caravans are known: in one Oxyrhynchos papyrus, a caravan of some 75 camels carried grain in the Western Desert, amounting to around 450 artabas of grain, certainly comparable in size with a number of ships' cargoes attested in the papyri.⁵⁹

As far as state transport is concerned, it is clear from our evidence that considerable quantities of produce could be shifted. We will consider this more fully below, but it suffices here to single out a few examples to determine scale. In one account of grain transport covering a seven-week period (*BGU XIII 2270*), a total of 1734 donkey loads are transported from granaries to harbour. In an papyrus preserving information about the number of animals from the nome travelling to the Fayum to help with transport there, a total of 411 donkeys are mentioned.⁶⁰ The context of the document suggests that the mobilization of such numbers of animals was not out of the ordinary, and this shows that, at least during busy periods, a substantial amount of land transport could take place.

ANIMAL MAINTENANCE

Of key importance to the economy of transport and keeping animals was maintenance: the food and care that an animal required.⁶¹ There are many factors that influence animal maintenance, and the amount of food which animals needed could be affected by the health of the animal, the climate in which it was working, how well-watered the animal was, and the size of the loads it might carry. The harder animals work, the more food they need to eat. Given this, the amount of food given to animals on a daily basis varied considerably, as did the quality of fodder, availability of grazing, and the size and weight of measurements of the units of grain; it is thus difficult to establish

⁵⁸ See Adams, 'Who bore the burden?', 171–92, considered more fully below.

⁵⁹ *P. Oxy.* XXXI 2766 (AD 305).

⁶⁰ *P. Oxy.* XVIII 2128 (AD 165?).

⁶¹ On the nutritional needs of animals, see T. Reekmans, *A Sixth Century Account of Hay* (*P. Iand. Inv.* 653) (Brussels, 1962), 36–7.

a 'normal' ration (even if there was one).⁶² In order to establish the cost of providing food, we need to determine not only how much fodder each animal was given, but also its cost, and this too fluctuated throughout our period and varied between different parts of Egypt and according to season.

The growth of fodder crops was a central part of agriculture—arguably only the production of cereal crops was more important.⁶³ The crops were flexible in use—they could be both grazed or cut and stored against future use, or both, or sold—there was a healthy market for fodder, to judge from the heavy demand evidenced in private letters, and clearly the effects of good or poor Nile floods would be reflected in the demand and price obtained for fodder crops.⁶⁴ Individuals who specialized in transport as an economic activity provided an important market, especially those who resided in the *metropoleis* or regularly travelled in the desert regions. Animals stationed and working in the Eastern Desert had to be provided with a large amount of fodder on a regular basis. There was a large demand from military units, especially those cavalry *alae* stationed throughout the *chora* and certainly in Alexandria. But landowners, even those with substantial holdings, might still require extra fodder, particularly at busy times of the agricultural year,

⁶² See Rathbone, 'The weight and measurement of Egyptian grains', 271: 'there were always in Roman Egypt a number of contemporary artabai and choinikes of different dimensions'. In *P. Köln* III 161 (second century) 2 choinikes were given daily. *O. Stras.* 718; 752; 758; 766; 768 all record $\frac{1}{12}$ artaba. *P. Mil. Vogl.* VII 303 (AD 162–3) records $\frac{1}{10}$ artaba, and in *O. Bodl.* II 1739 (second century) $\frac{1}{6}$ artaba is given. It is possible that the choenix was a set unit of $\frac{1}{40}$ of any artaba, see R. Duncan-Jones, 'The choenix, the artaba and the modius', *ZPE* 21 (1976), 43–52, with J. Shelton, 'Artabs and choenices', *ZPE* 24 (1977), 55–67; id., 'Two notes on the artab', *ZPE* 42 (1981), 99–106, and P. Mayerson, 'The sack (*σάκκος*) is the artaba writ large', *ZPE* 122 (1998), 189–94. The possibility that these disbursements are to be regarded as payment of rent is discounted by W. S. Bagnall, *Laches*, 163. In these cases no drivers are mentioned.

⁶³ J. Rowlandson, *Landowners and Tenants in Roman Egypt: The Social Relations of Agriculture in the Oxyrhynchite Nome* (Oxford, 1996), 20. On fodder crops, see Schnebel, *Die Landwirtschaft*, 211–18. For the Appianus estate, see Rathbone, *Economic Rationalism*, 214, who proposes that *χορτός* was the third most widely cultivated crop on the *phrontis* managed by Heroninos, and was probably grown on most units making up the estate.

⁶⁴ *P. Oxy.* XLII 3063 (second century) implies that fodder could be grazed and/or harvested: *ἔταν ὁ χόρτος βρωθῆ ἢ κοπῆ*.

when additional animals might be hired to supplement existing transport resources.⁶⁵

Donkeys were fed barley, but cheaper forms of fodder were available—green fodder (χόρτος), which could be a main source of food, and pasturage.⁶⁶ We have reliable evidence concerning the amount of fodder that, on average, animals seem to have required. Although these figures vary, it seems that the monthly ration of barley for a donkey was between 3 and 5 artabas. This could be supplemented by the *chortos* or by browsing.

Not only did the ration of barley vary, but also the price of an artaba.⁶⁷ During the second century, barley cost on average between 5 and 6 drachmas per artaba, although prices varied at a local level according to availability and demand, the rise of the Nile, or external pressures.⁶⁸ If we accept these figures for monthly rations, assuming animals were fed 5 artabas, it would cost between 15 and 25 drachmas per month, which gives an annual total between 180 and 300 drachmas. Maintaining animals was therefore an expensive business. This has to be borne in mind when estimating the level of animal ownership—animals may have been relatively cheap to buy, but maintaining them was a substantial commitment. An interesting letter from Oxyrhynchos makes clear the concern of the writer about maintenance costs: ‘I find it a surprise if three pairs of oxen are needed to irrigate the vineyard at Chalothis, which has not come to much. It is not so much the issue of the cost [hire] of the other pair, as of their feed and other expenses.’⁶⁹

⁶⁵ Rathbone, *Economic Rationalism*, 215, who notes that even though extensive amounts of land were given over to the production of fodder crops, demand still exceeded provision, so the estate regularly purchased hay.

⁶⁶ In *P. Oxy.* XXXVI 2778 (second or third century) a group of donkey-drivers state that they were normally given barley for their donkeys when transporting goods (λέγοντες ἔθος εἶναι κριθὴν τοῖς ὄνοις δίδοσθαι). Barley and *chortos* appear regularly in the Heroninos archive, see Rathbone, *Economic Rationalism*, 233.

⁶⁷ On barley prices, see Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 24–7.

⁶⁸ For example, *SB VI* 9017 (end of first/beginning of second century) records the price of 1 artaba of barley at Wadi Fawakhir as 16 drachmas. This price may have been high because of the distance travelled from the Nile Valley, but could equally be the result of the poor harvest of AD 99. See Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 22 with Bonneau, *Le Fisc et le Nil*, 171.

⁶⁹ *P. Oxy.* XLII 3063.

There were, however, cheaper forms of food. Green fodder (χόρτος) was provided for donkeys at the rate of 10 bundles per day, or 3 bundles for foals.⁷⁰ The price of fodder, like barley, could vary, but on estates economies of scale existed as they would produce their own.⁷¹ On the figures noted, the monthly cost of fodder was about 24 drachmas, or 288 per annum. The provision of fodder was an important aspect of animal husbandry and farming in general, and this is seen clearly in the Oxyrhynchite papyri, the focus of Rowlandson's study. Indeed, in the Nile Valley generally, large numbers of animals required maintenance, and when little pasture land was available, fodder could have been grown in spaces between main crops (as in Egypt today), could regenerate, but could also be cut and stored against future demand or be sold at a profit.⁷²

The other option was pasturage, which provided animal owners with an opportunity to cut maintenance costs. But pasture land was not in great supply, for as much land as possible was brought under cultivation. On estates, owners could provide for the needs of animals with pasture land, but smaller farmers who owned animals would have had to pay for pasturage so as to enjoy the full benefit of their crop-producing land. Much pasturage seems to have been on crown land, marginal land on which grass and other fodder crops were grown, and as it was not re-sown each year, no seed allowance was required.⁷³ A tax, the φόρος νομῶν, was paid for the use of such

⁷⁰ See *P. Mich.* XI 620 (AD 239–40) ll. 219; 281; 289. See also *P. Vindob.* G 32010 (third century). On χόρτος see Schnebel, *Die Landwirtschaft*, 211–28, who suggests that it could be used to describe any fodder crop. However, it seems usually to have meant grass, see Rowlandson, *Landowners and Tenants*, 20–1.

⁷¹ On the purchase of fodder, see Rowlandson, *Landowners and Tenants*, 21, with n. 67. The cost of hay in *P. Oxy.* XLI 2986 (second or third century) was 10 drachmas per bundle, but in the same text the writer claims that he was able to force another supplier to give him 15 bundles for 17 drachmas 1 obol, but the context suggests that there were possibly particular reasons for the cheap price in this transaction. It is clear that in certain villages fodder was not available, so higher prices could be charged. The price of fodder would vary according to harvests—poor Nile floods could mean shortages, as in *P. Oxy.* XXXI 2569 (AD 265).

⁷² On the storage of fodder, see *P. Oxy.* XXXI 2583 (second century), with Rowlandson, *Landowners and Tenants*, 21. For its production and sale, see Rathbone, *Economic Rationalism*, 215, and 233–5. See also Reekmans, *Sixth Century Account*, 16, for the production of fodder on units of a sixth-century estate.

⁷³ Fodder crops could be grown on other types of land, where they were often used in crop rotation, see Rowlandson, *Landowners and Tenants*, 20–1.

land, and was normally paid through village elders, whose task it was to supervise it. The amount paid varied from 48 to 400 drachmas, but our evidence for this tax is confined to a period of 55 years in the late second and early third centuries limiting the extent to which it is representative.⁷⁴ Whatever the case, pasturage could be a relatively expensive option within the cultivated areas, although it should be borne in mind that fodder crops could be grown in spaces between cultivated areas (as they often are even in semi-urban areas in modern Egypt), and this could supplement diets.

We should look at a particular example of the use of pasture land, as patterns of land holding and land use in villages often reflect the economic pursuits of their inhabitants. This is particularly so with the interesting case of Soknopaiou Nesos. This village will appear regularly throughout the course of this monograph, as transport seems to have been an important part of life there.⁷⁵ Few of the inhabitants of this village owned land, usually they farmed on land rented from other villages.⁷⁶ When land at Soknopaiou Nesos is mentioned it is usually pasture land, indeed it is, as Hobson states, 'significant that none of the documents connecting Socnopaiou Nesos with one or another imperial estate contains reference to agricultural activity; pasturage, sheep and boats are the points of contact between Socnopaiou Nesos and these estates'.⁷⁷ As the village lay on the fringes of the desert, and transport played such an important role in the economic life of the village, the availability of pasturage was important. Pasturage was easily available for camels, which are primarily bush feeders, and could easily be let loose to browse, even in the desert, as they are in modern desert

⁷⁴ *CPR* VI 4 (AD 182), 100 drachmas; *BGU* I 345 (AD 207), 200 drachmas; *SB* I 4284, 4200 drachmas for a year; *BGU* III 810 (AD 208), 400, 100, and 100 drachmas in three receipts; and *P. Fay.* 61 (AD 233), 48 drachmas. The charge was possibly determined on the number of animals released onto the land, but there is no indication in the documents about how the tax was set. See further, S. L. Wallace, *Taxation in Egypt from Augustus to Diocletian* (Princeton, 1938), 72.

⁷⁵ See the fundamental work of D. Hobson, 'Agricultural land and economic life in Soknopaiou Nesos', *BASP* 21 (1984), 89–109.

⁷⁶ Villagers from Soknopaiou Nesos farmed land at Apias, Heraklia, Nilopolis, and Boubastos.

⁷⁷ See Hobson, 'Agricultural land', 93.

regions.⁷⁸ Their impact on the vegetation of desert and sub-desert environments is slight.⁷⁹

Camels were more expensive to maintain than donkeys if fed fodder. Their daily ration of hay seems to have been 12 bundles, which would have cost 540 drachmas per annum. Camels could also be fed barley, but there is no evidence of how much they required.⁸⁰ Horses and mules were provided with similar quantities of hay to camels, which made them expensive to maintain,⁸¹ indeed given the horse's lower capacity for abstinence from food and water, they were certainly more expensive to keep than donkeys or camels.

There is some evidence in the papyri for the provision of stabling for animals. This was an especially important factor for those animal owners who did not own land, or who, like Aurelius Appianus, had a group of animals in the centre of his group of estates, which could be sent to any location in their estates to meet transport demands. We only have evidence for camel stalls or stables; donkeys were probably kept in the courtyards of houses, as they often are in modern Egypt.⁸² The purpose of stalls was to afford some shade for these larger animals, and, as Jördens suggests, possibly to store merchandise for transport or sale.⁸³ Camel stalls could provide convenient bases for trade within the *metropoleis*, which is implied by one papyrus, dating to AD 212, which although part of the Oxyrhynchos collection, actually relates to the city of Memphis.⁸⁴ One Theon, an ex-gymnasiarch of Memphis, petitions Calpurnius Isidorus, the strategos of the

⁷⁸ See Leonard, *The Camel*, 71 and L. A. Tregenza, *The Red Sea Mountains of Egypt* (London, 1955), 5–6 on bush feeding. See generally, Gauthier-Pilters and Dagg, *The Camel*, 33–49, esp. 39–41.

⁷⁹ Gauthier-Pilters and Dagg, *The Camel*, 33.

⁸⁰ For camels fed barley, see *P. Giss.* III 69 (AD 118–19), with Adams, 'Who bore the burden?'

⁸¹ See *P. Mich.* XI 620 (AD 239–40) ll. 221; 284; 289; 290. In *P. Mil. Vogl.* I 28 (AD 162–3), however, a horse is given $\frac{1}{10}$ artaba of barley, the equivalent of 4 choinikes, the same ration as a donkey—see W. S. Bagnall, *Laches*, 165. See L. S. B. MacCoull, 'An account of fodder for pack-horses', *ZPE* 25 (1977), 155–8.

⁸² See G. Husson, *OIKIA: Le vocabulaire de la maison privée en Égypte d'après les papyrus grecs* (Paris, 1983), 128–9, esp. 128 for references. To this list, add *P. Oxy. Hels.* 23; *P. Iand.* VII 142; *P. Kell.* I Gr. 38a; *CPR* I 12 = *SPP* XX 13.

⁸³ Jördens, 'Sozialstrukturen', 73. Horses appear to be given 3 choinikes in *SB* VI 9600 (169 BC).

⁸⁴ *P. Oxy. Hels.* 23 (AD 212).

Memphite nome. He claims that a camel-driver in his employ has absconded with money that he was paid in advance, perhaps for performing transport, and also carried away some camel equipment, presumably saddles or harnessing. Theon explains that he had so far refrained from any action regarding the issue, but that on seeing and arguing with the camel-driver near a camel stall that he owned, he was now willing to press charges. The camel stall was situated near the *δρόμος ἑξαγορευτικός* of the goddess Aphrodite in the city. It is probable then that Theon employed individuals to drive his camels, using his stall in the city as a base. In villages, it seems that camel stalls were built on the outer limits of property, often near roads. This seems clear in property lists or sales mentioning such buildings.⁸⁵ In one document from Kellis in the Great Oasis, a camel-driver named Horus son of Mersis, whom we will consider in more detail later, owned a camel stall bordering on land owned by others.⁸⁶

Camel stalls were expensive; the prices we have preserved are 2120 drachmas in the second century, and 3000 drachmas in the third.⁸⁷ A cheaper way of ensuring access to stabling, at least in the short term, was through hire, and leases of both short and long-term duration could be arranged. A lease agreement from Dionysias records a rate of 24 drachmas for 4 years, while another from Oxyrhynchos preserves part of a 5-year lease of premises, previously used to house camels, for use as a hen house at a rate of 60 drachmas per year.⁸⁸ Another document from Oxyrhynchos is a receipt for the lease of a camel stall for 6 months for the price of 220 drachmas.⁸⁹ We may assume that the difference in the rates charged was due to space being at a premium in *metropoleis* encouraging higher rents. The higher rates charged in the third century merely reflect a gradual increase in price and monetization, and should not be taken as evidence for price

⁸⁵ See, for example, *P. Iand.* VII 142 (AD 164–5) ll. 7–12.

⁸⁶ *P. Kell.* I Gr. 38a (AD 331), also mentioned in 38b l. 10.

⁸⁷ *CPR* I 12 = *SPP* XX 13 (second century) from Soknopiaiou Nesos; *PSI* VI 705 (end of third century; *BL* VII 236).

⁸⁸ *BGU* II 393 (AD 168); *P. Oxy.* IX 1207 (AD 175–6); other examples are *SP* XX 13; *P. Strash.* VII 706.

⁸⁹ *P. Oxy.* VI 964 (AD 263). Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 107, mistakenly has 230 drachmas.

inflation.⁹⁰ The cost of rent could be cut by sharing stables, and such an agreement is recorded in a papyrus again from Oxyrhynchos where the leasee undertakes to share part of a camel stall and make an annual payment towards rent.⁹¹

The maintenance of animals was a costly undertaking. Providing food for donkeys over a one-year period could often cost as much as purchasing the animal in the first instance. This surely must have further restricted the number of individuals who could buy and afford to maintain animals. For peasants and for small farmers wishing to supplement their numbers for transport during busy times of the year, animal hire must have been an attractive and cost-effective alternative, a topic to which we will return.

CONCLUSIONS

In this chapter we have reviewed the evidence for the working capacity of transport animals and their maintenance costs. There are many variables in both of these aspects of animal use. What we can definitely say is that terrain and distance were the main determining factors in decisions made about the size of animal loads, although, in the Nile Valley, animal owners did not encounter the problems that their counterparts in more mountainous regions of the Roman empire might experience. All animal owners faced maintenance costs, and these could be high; the annual cost of this could, at its highest, be similar to the capital cost of the animal, although it is clear that much of this might be 'invisible' in the sense that it was met from the owner's agricultural produce. But this does not mean that it was an economic factor that could be ignored or was insignificant. Rather than facing these costs, as we shall see, it was often better to find other strategies for meeting transport needs, such as part-ownership or hire of animals.

⁹⁰ See D. Rathbone, 'Monetisation, not price inflation, in third century AD Egypt', in C. E. King and D. G. Wigg (ed.), *Coin Finds and Coin Use in the Roman World: The Thirteenth Oxford Symposium on Coinage and Monetary History* (Berlin, 1996), 321–39.

⁹¹ *P. Oxy.* X 1280 (fourth century).

Animal Trade and Ownership

Now that we have established the nature of transport resources in Roman Egypt, and some principal factors in the economic and social aspects of animal ownership, we should turn to the issue of trade in animals, before drawing some general conclusions about patterns of ownership. With these issues set out, we can proceed in the following parts to consider how transport in Egypt was organized.

Animal sales documents and the nature of trade in animals have received significant scholarly attention; the most wide-ranging and recent treatment is by Andrea Jördens, who considers in detail the economics of animal trade and ownership.¹ It is beyond the scope of this study to consider such topics to their full extent, but some consideration of the trade in animals is necessary in order to establish patterns of ownership, trade and communication. Was the sale of animals a feature of local economies, or was it more widespread, with established markets attracting traders looking for good prices, and animals which they could sell on for a profit elsewhere? If there was a considerable mobility among animal dealers, might this also be reflected more generally among transporters? Were there individuals who specialized in animal trade? Was there a desire to buy and sell on particularly strong or healthy animals, which might have been attractive to well-to-do landowners for breeding purposes? If there was a healthy trade in animals, how might this have affected patterns of ownership? We shall consider below two case studies of individuals

¹ Jördens, 'Sozialstrukturen', and her introduction to *P. Louvre I* 13–15, pp. 90–3. Still valuable is O. Montevecchi, 'Ricerche di sociologia nei documenti dell'Egitto greco-romano III: I contratti di compra-vendita: a) compra-vendite di schiave e di animali', *Aegyptus* 19 (1939), 11–53.

engaged in the trade of selling donkeys, and set these examples in their wider context, in order to establish if they are illustrative of the trade in donkeys and so answer these broad questions.²

Discussions of animals sales have tended to focus on the nature and location of the market in terms of place—we do not have enough evidence to set them in time. We do not know if ancient animal markets in Egypt compared in any way to their modern counterparts—it was necessary for traders and buyers to know exactly where and when animal markets would take place. While it is probable that such markets took place at regular intervals and operated on different local and regional scales, we do not know for certain when, although a sixth-century text suggests that some took place on an annual basis.³ It certainly seems that traders were willing to travel some distance in order to sell animals; the same was true of those individuals interested in buying animals. While it is clear from our evidence that the Fayum was the largest market for selling animals in Egypt, prompting Jördens to suggest that there was little cross-nome donkey-trading in the Fayum, it is likely that this is an accident in the preservation of our evidence.⁴ Although the majority of our evidence does come from the Fayum, there is good reason to believe in a healthy and relatively mobile trade in animals in the Nile Valley. Indeed, on one estimate, perhaps as many as 100 000 donkeys may have been sold in any given year.⁵

² A useful list of donkey sales is given by S. van Lith in *CPR VI 2* (pp. 22–4), with the comments of R. Pintaudi, ‘Osservazioni su PSI XX Congr. 6’, *ZPE* 96 (1993), 125–6, and *P. Louvre I*, p. 91. The most recent list is in N. Litinas, ‘P. Lond. III 1128: sale of a Donkey’, *ZPE* 124 (1999), 195–204. For prices, see Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 287–94 and, more fully, id., ‘Eselpreise im römischen Ägypten: Ein Beitrag zum Binnenhandel’, *MBAH* 5 (1986), 34–48; D. Rathbone, ‘Prices and price formation in Roman Egypt’, in J. Andreau, P. Briant, and R. Descat (ed.), *Économie Antique: Prix et formation des prix dans les économies antiques* (St. Bertrand de Comminges, 1997), 183–244.

³ *P. Cairo Masp. I 67002* (AD 567); N. Litinas, ‘Market-places in Graeco-Roman Egypt: the use of the word ἀγορά in the papyri’, *Akten des 21. Internationalen Papyrologenkongresses, Berlin 1995* (Stuttgart, 1997), 601–6, esp. 604.

⁴ Jördens, ‘Sozialstrukturen’, 58–9.

⁵ Rathbone, ‘Prices and price formation’, 207. The estimate is based on an assumption that there would be one donkey per household, but this seems rather high. At any rate, there would have been a considerable trade in donkeys, and this explains the relative commonness of donkey-sale texts.

THE DONKEY-TRADERS EPIMACHOS
AND AURELIUS APOLLONIOS

Given the survival pattern of our evidence we have only vague impressions of the individuals involved in the sale of animals. Our documents are spread widely over place and time, so that these traders are shadows. However, in two instances, we have a glimmer of light—we can hardly be fastidious with our choice.

A resident of the Memphite nome during the second century named Epimachos son of Ploution seems to have been a trader in donkeys, for he is mentioned in two late-second-century papyri from the Memphite nome, which preserve details of donkey sales.⁶ The first, dated 26 August AD 178, records the sale of a female donkey to Epimachos by Asklas son of Asklas, of Memphis, for 172 silver drachmas; the second, dated 16 September AD 178, notes the sale of another female donkey to Epimachos by Horos son of Saras for 230 (?) drachmas. In the latter case, the sale took place in the village of Pitos in the Memphite nome. The documents are suggestive of a number of points. First, they run counter to Jördens' statement that cross-nome trading in donkeys was restricted to the Nile Valley. Second, it seems reasonable to suggest that, because the animals are bought over such a short period of time, Epimachos is purchasing for resale in the Fayum, perhaps at the animal market at Kerkesoucha. Doubtless Epimachos was confident that he could get a better price, for any variation in the price of animals was not determined so much by market conditions as by a number of factors such as the size and condition of the animals, as well as their gender. One feature of our evidence is that male animals tend to fetch higher prices, probably because they were stronger; but female donkeys were clearly important for breeding purposes, so any conclusions drawn about the relative cost of male and female animals, given the state of our evidence, must be unsafe, given so many untestable variables. Finally, there is further evidence that Epimachos may be an animal trader, and involved in trade at some distance. A private letter from Oxyrhynchos mentions an individual named Epimachos son of Ploution as the

⁶ *P. Col.* X 263–4 (26 August and 14 September AD 178).

owner of a share in a camel stall in Oxyrhynchos.⁷ The context of the letter suggests that Epimachos was not resident in Oxyrhynchos, and it is likely that we are concerned here with the same individual. If our assumptions are correct, it appears that Epimachos was a trader in animals, who may have engaged in such trade over considerable distances. His case might bear comparison with that of another trader, this time from Oxyrhynchos.

In four documents from the early fourth century, we have a record of a number of transactions undertaken by one Aurelius Apollonios, who may well have been a donkey trader.⁸ He may have been part of a number of such traders in Oxyrhynchos, for in two documents the trade of selling donkeys is expressly mentioned; traders being termed *ὀνομάγγωνες*, one of only two references to this term in the published papyri.⁹ These date to AD 307, and are therefore close in time to the four documents relating to Aurelius Apollonios. It seems from the context of the documents that the donkey sellers were capable of acting as a group. Aurelius Timotheus swears on oath that he has never engaged in the trade (*τέχνη*) of selling donkeys, and that he has been harassed by the donkey sellers with respect to the supply of two donkeys to the *magister rei privatae*. It seems that the donkey sellers were trying to off-load their responsibilities as a group to supply donkeys for state use onto other individuals. Their capacity to act as a group presupposes organization, and we can be confident that they formed an association or 'guild' of traders common in marketplaces. This is confirmed by one of the documents which specifically mentions a corporation, the *κοινὸν τῶν ὀνομαγγώνων*.¹⁰

Perhaps as part of this *koinon*, Aurelius Apollonios was engaged in donkey trading, and in the sale of horses, at least between the years AD 305 and AD 313. At any rate, on either 27 May or 14 June AD 305, Apollonios sold a male donkey, bronze in colour and growing its second teeth, to a soldier named Aurelius Arpestles (?) for the agreed

⁷ *P. Oxy.* XLI 2981 (second century). See *P. Col.* X 263–4 intro.

⁸ *P. Oxy.* XLIII 3143 (AD 305); *P. Corn.* I 13 (AD 311); *P. Oxy.* XLIII 3144 (AD 313)—a sale of a horse; and 3145 (early fourth century).

⁹ *P. Oxy.* XLIV 3192 (AD 307); *P. Oxy.* LIV 3728 (AD 306). *P. Oxy.* LXV 4491 (9 May AD 307) is a copy of XLIV 3192.

¹⁰ *P. Oxy.* LIV 3728 (AD 306), an application to the *logistes*, the nature of which is unclear.

price of 15 silver talents. Apollonius did well—this is a much higher price than any similarly dated donkey sale,¹¹ and the editor suggests that, although its colour was unusual, it was probably normal for animals bought by soldiers to sell at higher prices, as horses certainly did, because soldiers were better off than their civilian counterparts.¹²

Apollonius' next recorded transaction took place in the market of the Upper Cynopolite nome in AD 311, where he bought a female donkey for 10 silver talents.¹³ This was an important animal market, as we shall see. Probably around this time he sold another donkey at the market in Oxyrhynchos for the price of 12 silver talents to a man from the village of Senilais in the Hermopolite nome.¹⁴ Finally, in AD 313, Apollonius bought a Cappadocian horse for 30 silver talents from one Aurelius Domnus, a resident of the camp in the Hermopolite nome, at the market of Oxyrhynchos.¹⁵

Where did these transactions take place? Four documents other than those relating to Apollonius preserve what may be sales taking place in Oxyrhynchos: one between a resident of the Hermopolite nome and a resident of Oxyrhynchos;¹⁶ two sales involving inhabitants of the Oxyrhynchite nome buying animals at the market in the metropolis;¹⁷ and finally between two inhabitants of the Small Oasis, who had clearly come to Oxyrhynchos to trade.¹⁸ We know from one document concerning the collection of taxes that there was a market situated at the Serapeum in Oxyrhynchos,¹⁹ although animals are not mentioned we should not discount the possibility

¹¹ Inflation is an obvious factor at this date, although its effects are often exaggerated and misunderstood. On price inflation and the monetary economy, see Rathbone, 'Monetisation'; and specifically on donkey prices, Rathbone, 'Price and price formation', 207–10.

¹² Horses bred for military use were more expensive, see *BGU XI* 2049 intro., and *P. Oxy.* XLIII 3144.

¹³ *P. Corn.* I 13. The editors date the text to AD 288; for corrections see *BL VII* 40, cf. J. D. Thomas, 'Chronological notes on documentary papyri', *ZPE* 6 (1970), 181–2.

¹⁴ *P. Oxy.* XLIII 3145 (early fourth century). It is difficult to use the price as an indication of date, as the editor notes.

¹⁵ *P. Oxy.* XLIII 3144 (AD 313).

¹⁶ *PSI XIV* 1417 (AD 290–1).

¹⁷ *SB VIII* 9829 (third century) and *SB VI* 9214 (AD 311).

¹⁸ *P. Mert.* III 106 (late third century).

¹⁹ *SB XVI* 12695, with J. R. Rea, 'P. Lond. inv. 1562 verso: market taxes in Oxyrhynchus', *ZPE* 46 (1982), 191–209.

that animals were sold there. The fact that two men from the Small Oasis come to Oxyrhynchos to sell and buy a donkey respectively shows that such a market existed. As in modern Egypt, where particular towns are known to hold animal markets on specific days, the inhabitants of Roman Egypt knew where to buy and sell animals, and it is clear from our evidence that certain towns became centres for the animal trade. Markets, but more especially, the goods sold there, 'naturally ended up at a spot where, as everybody would know, just those items could be sold'.²⁰

Apollonius travelled to the market of the Upper Cynopolite nome in AD 311, where, as we have seen, he bought a donkey. This market seems to have developed over time into one such widely known animal market. Whereas the markets of nome capitals would be large and diverse, dealing in all kinds of commodities, and would often be linked to temples, as the market at Oxyrhynchos was to the Serapeum, other smaller markets may have specialized in animals or other commodities.²¹ These specialized markets appear to have developed from the third century onwards. A significant number of donkey sales took place in the market of the Cynopolite nome, which suggests that this was an important centre for such trade.²²

²⁰ R. MacMullen, *Roman Social Relations* (New Haven, 1974), 72.

²¹ For markets generally, see R. MacMullen, 'Market-days in the Roman empire', *Phoenix* 24 (1970), 333–41; L. de Ligt, *Fairs and Markets in the Roman Empire: Economic and Social Aspects of Periodic Trade in a Pre-Industrial Society* (Amsterdam, 1993), who does not deal extensively with Egypt; J. M. Frayn, *Markets and Fairs in Roman Italy: Their Social and Economic Importance from the Second Century BC to the Third Century AD* (Oxford, 1993), who concentrates on Roman Italy; and B. D. Shaw, 'Rural markets in North Africa and the political economy of the Roman empire', *Ant. Afr.* 17 (1981), 37–83, for a broad, comparative approach to markets in North Africa, stressing the difficulties experienced by Roman authorities in controlling periodic trade. On Egypt, see N. Litinas, 'Market-places in Graeco-Roman Egypt'.

²² This is known from the fourth century onwards as ἀγορὰ Ἄνω Κυνωπολίτου. Relevant texts are: *P. Oslo* III 134 (first half of third century); *SB XII* 11015 (first half of third century); *P. Oxy.* 32 4B 4/A (1–2) a (AD 307); *P. Oxy.* 28 4B 62/B (5–7) a (AD 307); *P. Berl. Leihg.* I 21 (AD 309); *P. Corn.* I 13 (AD 311); *P. Oxy.* XIV 1708 (AD 311); *P. Oxy.* 28 4B 62/B (3) a (AD 311). See the list of sales compiled by Litinas, 'Market-places in Graeco-Roman Egypt', 605–6. See N. Litinas, 'Villages and place-names of the Cynopolite nome', *Archiv für Papyrusforschung* (1994), 158, where he states that 'the Cynopolite nome was a centre for the breeding and selling of donkeys': see *P. Oslo* III 134 and *SB XII* 11015. To these texts should be added *P. Oxy.* LXIX 4748, 4750, and 4752, adding weight to the importance of the Cynopolite market.

It is certain that geography played an important role in influencing the location of these markets. We know little for certain about the location of these markets, but something can be made from our evidence. The Cynopolite nome lay close to the Nile and the adjacent Bahr Yusef, which made it easy to transport animals there should they be taken by river, although it is more than likely that most animals were taken overland to markets. Additionally, the Cynopolite nome lay within easy reach of the region extending from the Arsinoite nome to the Hermopolite to the south.²³ Further examples of trading links between nomes can be found in Oxyrhynchos: in one case a man from Penne in the Heracleopolite nome sold a donkey to an inhabitant of Oxyrhynchos—both having gone to an established market for the purposes of trade; while another document shows trading links between the village of Bubastis and Oxyrhynchos.²⁴ We should note that it seems that many donkeys from the Cynopolite nome were drafted in for service carrying state grain in the southern reaches of the Arsinoite nome, which shows that it was within easy reach of the Fayum.

In the Arsinoite nome geographical position had a profound effect on animal markets too. A number of villages stand out as being of particular importance in the animal trade. Kerkesoucha, a village in the north of the Herakleides division of the nome, had an important animal market, which may have specialized in the donkey trade.²⁵ Indeed, a significant number of donkey-sale documents concern this village, although no documents date beyond AD 219. This village was linked administratively to Karanis,²⁶ so later documents mentioning Karanis may concern the same market. The predominance of Oxyrhynchos and the Cynopolite nome in later donkey sales suggests that they may have replaced Kerkesoucha as centres of the donkey trade, although it is probable that local markets still played an

²³ Litinas, 'Market-places in Graeco-Roman Egypt', 604.

²⁴ *P. Oxy.* XIV 1708 (AD 311); *P. Wisc.* I 15.

²⁵ *P. Stras.* VI 504 intro.; P. J. Sijpesteijn, 'Ἐπίμουχοι: a non-existing locality', *Anagennesis* 3/1 (1983), 145–6; J. Schwartz, 'De quelques villages de nome Arsinoïte à l'époque romaine', *CRIPEL* 10 (1988), 141–8.

²⁶ H. Gemerek, *Karanis: Communauté rurale de l'Égypte romaine au IIe–IIIe siècles de notre ère* (Warsaw, 1969), 15–17.

important role. Alexandrou Nesos in the Arsinoite seems also to have hosted a market, perhaps for animals.²⁷

The centre of the donkey trade in the Fayum, however, seems to have been the village of Soknopaiou Nesos (Dimê), which also played a crucial role in the camel trade. There was a trading link between this village and the market at Kerkesoucha; indeed traders from Soknopaiou Nesos often travelled to other villages to buy animals. These individuals can be identified by their Egyptian names, and, when such names turn up in sale agreements in other Fayum villages (or beyond), we can be fairly sure that the traders come from Soknopaiou Nesos. Jördens identifies as many as 30 contracts of sale that may have been drawn up involving traders from Soknopaiou Nesos. Of these, eight were drawn up in Kerkesoucha, suggesting that one in every three donkeys may have been bought at that market.²⁸ It is also the case that these traders travelled further afield in search of animals, travelling to Heracleia, Euhemeria, Theadelphia, and the metropolis Ptolemais Euergetes.²⁹ They travelled beyond the Arsinoite nome; for example, in a recently published text, we find an inhabitant of Soknopaiou Nesos buying a donkey at Psintanu in the Heliopolite nome.³⁰ Together with the example of Epimachos discussed above, it seems clear that, although the Fayum possessed animal markets, traders in animals were mobile and often engaged in trade further afield.

Soknopaiou Nesos was an odd village, for it lacked some of the features typical of villages in Roman Egypt, and has thus received some attention from scholars. The picture of the village that will emerge below is of one heavily involved in the trade of both donkeys and camels, and in the provision of transport services. This specialization seems at odds with the general picture drawn of Fayum villages

²⁷ Jördens, 'Sozialstrukturen', 50. Other villages such as Theadelphia, Bacchias and Apias and Arsinoe, the nome metropolis, have also produced donkey-sale documents. See Jördens, 'Sozialstrukturen', 51. See also Montevecchi, 'Ricerche di sociologia', 38. Two sales documents originate from this village, and details are also preserved of payments made for the 10 per cent sales tax recorded at the *grapheion* (BGU XIII 2275 (AD 155); 2293 (AD 147–55)).

²⁸ Jördens, 'Sozialstrukturen', 52–3.

²⁹ Heracleia—*P. Lond.* II 303 (p. 195) (AD 142); Euhemeria—*P. Stras.* 251 (AD 69/79); Theadelphia—*P. Fay.* 92 (AD 126); Ptolemais Euergetes—*P. Flor.* I 22 (AD 177)

³⁰ *P. Louvre* I 15 (AD 139).

as being founded upon continual preoccupation with irrigation and subsistence agriculture. Soknopaiou Nesos lacked this agricultural base; in fact the village possessed almost no land itself, its villagers usually farming land they rented at other villages such as Apias, Heraklia, Nilopolis and Boubastos.³¹ The village, as its name suggests, was also a centre for the worship of the crocodile god Souchos with a high proportion of its inhabitants holding priesthoods.

We have seen that the inhabitants of Soknopaiou Nesos were heavily engaged in the animal trade. This seems also to have been true for inhabitants of Arsinoe (Ptolemais Euergetes), the metropolis of the Arsinoite nome.³² Donkeys were rarely sold in Arsinoe itself, but metropolitans are frequently found selling donkeys at other locations. They rarely seem to buy animals. It may have been that Arsinoe was the main base for donkey breeders and traders. Perhaps this may have been because they were wealthier than their village counterparts and had more capital. These breeders and traders could also have been the owners of considerable amounts of land who were resident in the *metropoleis*. As we shall see, large landowners certainly had the resources and opportunity to breed animals on their estates.

Schwartz suggests that donkey breeding usually took place near markets, and that Kerkesoucha was the centre of breeding.³³ But he does not fully account for a number of issues. First, if we are right in suggesting that animals were often bred on large estates, they were not necessarily located near markets. Second, donkey breeders would be attracted to markets that specialized in animal trade, rather than to local periodic markets, as they would have been more certain to sell their animals. Those individuals interested in buying animals would have preferred to visit a specialized market offering them more choice.³⁴ Third, there seems to have been a gradual trend towards specialization in donkey trading as a profession.³⁵ Jördens noted that in the Fayum, there was a small group who virtually monopolized the

³¹ See Hobson, 'Agricultural land'.

³² Discussed in detail by Jördens, 'Sozialstrukturen', 56–7.

³³ Schwartz, 'Quelques villages', 144 and 147.

³⁴ A modern example is the weekly animal market held in the Middle Egyptian town of Esna on each Saturday. As we have noted above, prospective buyers know where and when a suitable market takes place.

³⁵ Although we should be mindful that many sale transactions may not have involved markets at all, but been private deals between acquaintances.

market. In this sellers' market, traders could afford to ignore local periodic markets in favour of specific animal markets. The market structure, of a small number of specialized markets, and development of specific groups of traders, such as the *ὀνομάγγωνες* of Oxyrhynchos, would not have been possible if competition had been greater.³⁶

It seems probable that landowners, if they possessed a reasonable number of animals, could have engaged in breeding and trade. But a noticeable factor in animal trade is the involvement of individuals who we might rank as urban 'middle class'. In Arsinoe up to 22 sales were effected through contractors, seven public banks are involved in these transactions, and in one case, that of one Maron son of Ptolemaeus, in the space of 8 days he sold, bought and then sold another donkey.³⁷ As we have seen, it was relatively common for the inhabitants of *metropoleis* to own or hire animal stables, and it would have been in these that the animals were housed. It was probably men of this group that made up the *koinon* of donkey sellers in Oxyrhynchos in the early fourth century, and it is probably not without coincidence that one individual, admittedly much earlier, registers two donkeys which he owns for his own use, housed at his property near the Serapeum at Oxyrhynchos.³⁸

We must return then to our subject, Aurelius Apollonius. How typical was he of men engaged in his trade? He certainly seems to be a member of the 'urban middle class', involved in trading animals, and probably travelled regularly to markets in the Cynopolite nome, and perhaps further afield. It is most likely that he was a member of the *koinon* of donkey traders, which had grown up as a result of the monopolization of donkey trading into the hands of a small number of individuals. As such then, his career, such as we can make of it, might be taken as typical of a donkey trader in Egypt.

We must now turn to the prices.³⁹ A number of points should be made. It is erroneous to take animal price fluctuations as anything

³⁶ Jördens, 'Sozialstrukturen', 58.

³⁷ *P. Hamb.* I 33 col. II, ll. 19–28.

³⁸ *P. Oxy.* XII 1457 (4–3 BC).

³⁹ Prices for donkeys have been studied exhaustively, see Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 280–96; id., 'Esepreise'; Rathbone, 'Price and price formations'; and for the fourth century, R. S. Bagnall, *Currency and Inflation in Fourth Century Egypt* (Atlanta, 1985), 67–8.

more than a rudimentary guide to economic decline or improvement; the only certainty is that prices rose gradually over time (but the general prosperity enjoyed by Egypt in the late first and early to mid-second century is reflected in fairly stable price levels in this period). Animal cost varied considerably according to a number of factors: the fitness, age and sex of the animal (although it is likely that the strength and fitness of an animal was just as important as sex), availability, the notoriety of the breeder and skill of the trader, and the quality of the animals' parents, all of which are beyond the scope of our evidence. There is no reason to expect ancient buyers not to approach the investment of considerable capital in animals in the same way as their modern counterparts. Buyers were looking for well-bred and healthy animals, and to this end, a common feature of donkeys sale contracts is the inclusion of a clause guaranteeing the buyer against defects.⁴⁰

The average price for donkeys was: from c.AD 98–148, about 130 drachmas; c.AD 150–90/5, 144 drachmas; c.AD 197–219, 556 drachmas; and after c.275, prices rose considerably so that by AD 316, prices could range up to c.40 talents.⁴¹ The large increase in price in the early third century can perhaps be explained by the effects of a cattle plague which broke out towards the end of the second century, which may have affected the price of animals generally.⁴² Towards the end of the third century, the drastic increase in price can be assigned both to the effects of general inflation and, perhaps more importantly, an increase in monetization.⁴³

Taking these average prices into account, it is readily apparent that donkeys were expensive, and that the purchase of one represented a considerable investment of capital, and certainly exceeded the value of a full year's wages for a peasant farmer.⁴⁴ Given this, who bought

⁴⁰ Most contracts contain some form of guarantee; BGU I 13 = *M. Chr.* 265 (AD 289) is a particularly good example, containing a guarantee that the animal was fit and healthy (ὕγιος καὶ ἄκρωτος).

⁴¹ See Rathbone, 'Price and price formation', 208–10, for a detailed discussion of fluctuation in price and price ranges.

⁴² Suggested by Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 39, but it is not clear if animals other than cattle were directly affected.

⁴³ On monetization, see Rathbone, 'Monetisation'.

⁴⁴ Again, there is the caveat that animal costs and average wages fluctuated, which make precise estimates impossible. On average earnings, see Johnson, 'Roman Egypt', 301–10, who estimates that a peasant farmer in the middle of the second century may

these animals? Jördens argues that the main market for donkeys was provided by these small farmers and that most would have owned animals. But was this really the case?⁴⁵ The largest estates apart, most middle-sized farms, such as the estate of Epimachos in the Hermopolite nome, possessed only a small number of animals.⁴⁶ As we shall see, it was more economically viable to hire animals at crucial times of the year, such as harvest time, to perform additional transport tasks. On small plots of land, it may have been the case that human labour was used to undertake such transport work as was necessary, and that this was augmented during the harvest by the hire of animals to carry produce to the village threshing floors. Farmers could thus perform all their transport operations in the cheapest way, without investing in an animal. There is important evidence that suggests that farmers were reluctant to so invest. In four documents, it seems that farmers could share the cost of owning animals, in an attempt to make it more economical—it is the only logical interpretation. These texts record the sale of ‘part of an animal’ or a ‘share’ in an animal.⁴⁷

So the ownership of donkeys was probably less widespread than Jördens suggests, indeed many small farmers could not afford to buy or maintain animals. This is suggested by a private letter from Oxyrhynchos, dating to the third century, perhaps written by a tenant farmer, regarding demands made by a *dekaprotos* about the transport of tax grain: ‘and now he worries us and the cultivators who have no animals, and he worries us about fodder and about expenses. Send him [one Dionysios], for he knows the account, so that we also can get animals.’⁴⁸ The letter nicely illustrates many of the concerns that owners of animals had concerning their

have subsisted on 100–150 drachmas per annum. See R. S. Bagnall, *Egypt in Late Antiquity* (Princeton, 1993), 38, who suggests that in late antiquity the average cost of a donkey represented between 5 and 10 months’ income. All this militates against Rathbone’s estimate of one donkey per household, mentioned above.

⁴⁵ Jördens, ‘Sozialstrukturen’, 58.

⁴⁶ Accounts from this estate are preserved in *P. Lond.* II 131 recto and are discussed in Chapter 9.

⁴⁷ *P. Soterichos* 27 (AD 126); *P. Lond.* II 333 (p. 199) = *M. Chr.* 176 (AD 166); *SB I* 5679 (AD 307); and *P. Kell.* I Gr. 34 (AD 315). Unfortunately the documents do not preserve information on the animals’ use.

⁴⁸ *P. Oxy.* XIV 1671 (third century).

maintenance, and reasons why ownership may have been restricted. This phenomenon was certainly not confined to Egypt, but was probably a feature of the agricultural economy throughout the Roman world.⁴⁹ This is not to say that ownership was not widespread, rather that we should not assume that all farmers owned transport animals.

Other strategies, therefore, had to be implemented. Part-ownership, as we have seen, is evidenced in the papyri. It is likely that farmers would regularly have found it possible to borrow animals either from relatives or neighbours, but such arrangements are just those that we would not expect to find in the papyrological record. But there are two examples, which we can assume represent a widespread practice. The first is a petition from the Archive of Kronion, where Kronion petitions the *strategos* regarding a woman from the metropolis (Arsinoe) who has failed to return a donkey which he lent her.⁵⁰ The second, from Oxyrhynchos, is a request to borrow a donkey to transport wheat.⁵¹

Most often, however, it was possible and economical to hire animals. There is some evidence for the cost of hiring donkeys, and while it is clear that the increase in the capital value of the animals is reflected in an increasing charge for hire, it seems that overall, it was cheaper to hire than to buy.⁵² The hire of a donkey and foal in AD 33 cost 3 drachmas per month;⁵³ in c.AD 117, donkeys were rented at 4 obols daily (about 20 drachmas per month);⁵⁴ later in the second century, 2 (or possibly 3) donkeys were hired for 14 obols daily, and their drivers were paid 12 obols (each tending 2 or 3 animals);⁵⁵ while in AD 215 donkeys here hired at a rate of 4 drachmas per day;⁵⁶ finally, another third-century document has the hire of donkeys at

⁴⁹ See the comments of W. Jongman, 'Adding it up', in C. R. Whittaker (ed.), *Pastoral Economies in Classical Antiquity* (Cambridge, 1988), 210–12.

⁵⁰ *P. Kron.* 2 (AD 127 or 128).

⁵¹ *P. Oxy.* LIX 3995 (third century).

⁵² Prices are gathered by Johnson, 'Roman Egypt', 405–7, and Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 342–50.

⁵³ *BGU* III 912.

⁵⁴ *PSI* VI 688 R.

⁵⁵ *P. Oxy.* VII 1049.

⁵⁶ *BGU* II 362.

16 drachmas per month.⁵⁷ A good example of the hire of donkeys is preserved in a text from Oxyrhynchos, which records details of the transport of *chortos* to the threshing floor of Ophis from the lands of a tenant farmer.⁵⁸ It took 4 days for the transport operation to be completed at the total cost of 99 drachmas. Nine donkeys were used on the first day, followed by 12 on the second, and 4 and 6 on the final 2 days. Thus a total of 31 donkey days was needed to complete the transport. By hiring animals, this farmer was able not only to cut the cost of the whole operation in terms of capital investment, but also to perform it much more quickly. As Rowlandson points out, the fact that this farm kept written records suggests that it was fairly large; it is unlikely that this would have been done on smaller properties. On these, it has been suggested above that transport would have been performed by human labour, and, Rowlandson plausibly suggests, by unpaid members of the farmers' families.⁵⁹ There is certainly evidence to show that tenants working small plots of land could own donkeys,⁶⁰ but sharing animals or hiring them was cheaper and probably more widespread. It is unlikely that small farmers could make additional profits from breeding animals, as the necessary capital investment was beyond their means. Finally, we should note that the *poros* necessary for supplying donkeys for state service was 1200 or 2000 drachmas, which was probably a good deal more than a small farmer could muster.⁶¹

It will become clear below that it was not only small farmers who hired animals for transport on their land but also those who owned large estates.⁶² In the donkey sale contracts, as with those selling them, the individuals buying animals are largely shadows in our evidence. However, in a number of cases, the status of buyers is certain. The first example is a sale in the Cynopolite nome to a citizen

⁵⁷ SB XII 10802.

⁵⁸ *P. Oxy.* VII 1049 (late second century), discussed by Rowlandson, *Landowners and Tenants*, 226. It was usual for tenant farmers to be responsible for the cost of transporting their produce.

⁵⁹ Rowlandson, *Landowners and Tenants*, 226.

⁶⁰ *P. Oxy.* XXXI 2583.

⁶¹ N. Lewis, *The Compulsory Public Services of Roman Egypt* 2nd edn (Florence, 1997), 38.

⁶² See Chapter 9.

of Oxyrhynchus who is described as a gymnasiarch.⁶³ The second example is from the so-called archive of Aurelius Isidorus. In this document a donkey is sold to Aurelius Ptolemaeus, the father of Aurelius Isidorus, by one Aurelius Julianus from Hippos in Palestine.⁶⁴ Although it is likely that Ptolemaeus was always a farmer, his father was a Roman veteran, and as such he was probably reasonably wealthy compared to his Egyptian counterparts. Aurelius Isidorus' family worked land that they both owned and rented, and were also reasonably wealthy. The final example is from a recently published papyrus dating to the early or middle third century.⁶⁵ In this text, an unknown man, who styles himself ex-gymnasiarch and ex-chief priest of Hermopolis, sells a donkey to a soldier of the Legion III Augusta (?) for the price of 1300 drachmas. Veterans are mentioned commonly as buyers of donkeys.⁶⁶ In cases where animals are bought by individuals from Soknopaiou Nesos, it is likely that they were animal dealers, or were engaged in transport as a first line of business. Other buyers, citizens of *metropoleis* and estate owners, soldiers and veterans, were again wealthy in comparison to peasant farmers, the first two groups no doubt members of the same urban middle class as the animal sellers.

In sum, peasant farmers did not provide an important market for donkey sellers. The ownership of donkeys amongst peasant farmers was not widespread, and initiatives for cutting the cost of investment in animals were pursued, whether this be sharing animals with peers or hiring animals to perform transport tasks at busy times in the farming year.

THE SALE OF CAMELS

Similar phenomena as we have seen above with the trade in donkeys characterize the trade in camels; and Soknopaiou Nesos again displays a particular importance in animal trade and in transport

⁶³ SB XII 11015 (first half of third century).

⁶⁴ *P. Cairo Isid.* 84 = SB VI 9221 (AD 267).

⁶⁵ *P. Lond.* III 1128 = *ZPE* 124 (1999) 195–204.

⁶⁶ *P. Mich.* IX 551 (AD 103); *P. Mey.* 13 (AD 141); *PSA Athen.* 27 (AD 150); *P. Oxy.* XLIII 3143 (AD 305).

more generally. However, there are significant differences in the patterns of trade of both animals and in the documentary practice displayed in the contracts of sale.⁶⁷ There is more variation in the form of documentation, for they act not only as *cheirographai* (records), but also as *diagraphai* (guarantees), and there is a more private feel to them, for fewer camel sales are drawn up by public notaries than is the case for donkey sales.⁶⁸ The chronological spread is also more restricted: the earliest camel sale dates to AD 30, only two others are extant from the first century, with most dating to the mid-second century.⁶⁹ Finally, camels were much more expensive than donkeys, on average roughly four times the price of donkeys during the second century AD.⁷⁰

Our evidence suggests that the two villages of prime importance to the trade in camels were Soknopaiou Nesos and Dionysias. Both lay on the fringes of the desert, and as we shall see, their geographical location dictated their importance to a large extent. In almost every camel-sale transaction, at least one of the parties is usually a resident of Soknopaiou Nesos, and where this is not the case, the party is from Dionysias.⁷¹ It seems that residents of Soknopaiou Nesos were engaged mainly in the selling of camels, and can only be seen buying camels in two documents.⁷² This suggests that camel sales did not take place at periodic markets throughout the Fayum, but rather, that camels were sold at Soknopaiou Nesos and Dionysias where they were bred.⁷³ Residents of Soknopaiou Nesos traded with customers from other nomes, as is shown by documents which mention buyers from Terenuthis in the Prosopite nome, from Mareotis, and Kysis in the Great Oasis, from where further connections could be made to the Oxyrhynchite nome and the Thebaid.⁷⁴

⁶⁷ A list of camel sales can be found at *P. Vindob.* Worp 9, and is supplemented by Jördens, 'Sozialstrukturen', 64, n. 131, to which should now be added *P. Louvre* I 12 (AD 142).

⁶⁸ Jördens, 'Sozialstrukturen', 64, n. 130.

⁶⁹ First century sales: *P. Oxy.* LVIII 3915 (AD 30); *P. Med. inv.* 71. 27a; *BGU* XI 2112 (Claudius or Nero).

⁷⁰ Drexhage, 'Eselpreise', 41.

⁷¹ Recognized by Schwartz, 'Quelques villages', 147.

⁷² *BGU* I 153 = *M. Chr.* 261 = *SPP* XXII 48 (AD 152); *BGU* I 88 (AD 147).

⁷³ Jördens, 'Sozialstrukturen', 62.

⁷⁴ Jördens, 'Sozialstrukturen', 63. Terenuthis: *P. Lond.* III 1132b (p. 141) (AD 142); *P. Gen.* I 29 (AD 137); *BGU* II 453 = *M. Chr.* 144 (AD 154); and *P. Prag.* II 155. Mareotis: *BGU* I 13 = *M. Chr.* 265 (AD 289). Kysis: *P. Kell.* I 34 (AD 315).

It is not surprising to see this clustering of trade in camels at termini of desert routes—these animals could be bought in exactly the places they were needed.

Our evidence from Soknopaiou Nesos suggests that families were involved in the breeding and sale of camels. This has been treated extensively by Jördens, who has found that these families represented a kind of social elite within the village, and it is no accident that they were also priests.⁷⁵ The peculiarities of landownership in the village meant that investment of capital was made in camel stock rather than land, and in a number of cases it is possible that camels were considered common property in families, and ownership can be traced through a number of generations.⁷⁶ The fact that women appear as camel owners indicates inherited wealth, passed on in the same way that land might be under normal economic circumstances.⁷⁷ Further confirmation of this comes from the fact that women were involved in the sale of camels.⁷⁸ One interesting question which follows is whether women as animal owners were involved in their use, and some evidence that they might have been comes from in the form of a receipt from a female *καμηλοτρόφος* for late payments due to her for the transport of tax grain from the village of Dionysias to the Nile harbours.⁷⁹ Most likely in this case is that Taouetis daughter of Totes was the owner of the camels, but employed drivers to actually perform work.

Families could own significant numbers of stock. The best example is that of a man named Stotoetis, who owned as many as 26 camels, which in the late second century AD must have been worth a considerable sum at an average price of 652.8 drachmas each. It seems

⁷⁵ Jördens, 'Sozialstrukturen'. On Soknopaiou Nesos, see D. Hobson, 'Agricultural land', and ead., 'P. Vindob. Gr. 24951 + 24556: new evidence for tax-exempt status in Roman Egypt', *Atti del XVII. Congresso Internazionale da Papyrologia* (Naples, 1984), iii 847–68. A. Leone, *Soknopaiou Nesos nel periodo ellenisto-romano* (Naples, 1995) hardly merits mention.

⁷⁶ See Jördens, 'Sozialstrukturen', 64–72, in detail.

⁷⁷ Jördens, 'Sozialstrukturen', 65; D. Hobson, 'Women as property owners in Roman Egypt', *TAPA* 113 (1983), 311–21. A good example of a female camel-owner declaring her property is *P. Grenf.* II 45a (AD 137), in this case six camels.

⁷⁸ See *BGU* I 87 = *M. Chr.* 260 (AD 144).

⁷⁹ *P. Aberd.* 30 (c. AD 139).

clear that his was not the only family to own large herds.⁸⁰ Ownership of a significant number of animals meant that camels could be more easily bred, and there is clear evidence for this in the camel declarations, especially in the case of those owners who possessed unusual names. Owners from the family of Kiobis can be traced through two generations of breeding.⁸¹

The important question here is what the economic goals of these animal owners were.⁸² Is there reason to believe that the families of priests, who largely made up the elite of Soknopaiou Nesos, were engaged in innovative economic activities? Were priestly families turning to new sources of revenue? The Augustan restriction on temple property and landownership probably had profound effects on the economic condition of these families, and landownership generally in Soknopaiou Nesos did not fall into the usual pattern we might expect in Fayum villages.⁸³ But was it not natural in a village lying on the terminus of a desert route that transport and transport animals should become a valuable economic pursuit and capital investment? Camels became the patrimonium of these families, representing wealth normally invested in land. One advantage of this was that the number of animals could expand naturally through breeding; but problems remained. Herds could become broken up through inheritance patterns, and it was possible that the subsequent owners of camels could not maintain them. There was no impediment on ownership by priests or women, but it was difficult for them actually to undertake any transport, and indeed there are few clear examples in the record of owners actually undertaking transport with their animals.⁸⁴ But if this is the case, it cannot be claimed that this is an innovative response to their economic climate, but merely a pragmatic one; it is probably safe to doubt the plausibility of innovative economic thought on the part of traditionally conservative

⁸⁰ On the family of Stotoetis, see Jördens, 'Sozialstrukturen', 66; on camel prices, see Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne*, 296. On other families, see Jördens, 'Sozialstrukturen', 66, with n. 141.

⁸¹ Jördens, 'Sozialstrukturen', 64–5, with n. 142–5.

⁸² Discussion in Jördens, 'Sozialstrukturen', 70–2 and Schwartz, 'Quelques villages'.

⁸³ On land ownership, see Hobson, 'Economic life'.

⁸⁴ *P. Customs* 29; 214; 140. See Jördens, 'Sozialstrukturen', 71, with n. 165. It seems likely in the case of *P. Aberd.* 30 that drivers were employed.

priests.⁸⁵ It also may exaggerate the importance of animal ownership, and perhaps it is best to see this as an economic pursuit of secondary importance; priests were often involved, for example, in the production of textiles.⁸⁶

THE TRADE OF ANIMALS IN THE CUSTOMS-HOUSE DOCUMENTS

Animals are themselves the objects of trade in some 50 customs-house receipts or entries on customs registers.⁸⁷ The most striking example of this is a recently published receipt from Oxyrhynchos, where Sarapas, an Oxyrhynchite, travelled through the customs house at Dionysias in the Fayum, importing 10 donkeys and 4 camels 'for all kinds of work'.⁸⁸ Animals are both imported and exported through the villages of Soknopaiou Nesos, Karanis, Dionysias, Philopator Alias Theagenes, Bakkhias, and Tebtunis; as we would expect, Soknopiaou Nesos is by far the most highly attested village in this respect.⁸⁹ It seems that export was more important than import overall; however, the import and export of camels seem to have been fairly evenly matched, which suggests that these animals were more

⁸⁵ See Jördens, 'Sozialstrukturen', 71; contra Schwartz, 'Quelques villages', 147, who argues that priests needed to replace revenues lost as a result of Augustus' temple reforms.

⁸⁶ See Hobson, 'Economic life', 107, cited by Jördens, 'Sozialstrukturen', 72, n. 167, and generally on the economic activities of the priesthood, W. Otto, *Priester und Tempel im hellenistischen Ägypten: Ein Beitrag zur Kulturgeschichte des Hellenismus*, 2 vols (Leipzig and Berlin, 1905–8), ii 185–95.

⁸⁷ See *P. Customs*, pp. 58–60; Adams and Gonis, 'Two customs-house receipts'.

⁸⁸ *P. Oxy.* LXIX 4740 (AD 183); very few receipts are found outside the Fayum. The document is interesting on a number of counts; first the large number of animals, and second, that it militates further against Jörden's suggestion that there was little cross-nome trade in animals. If Sarapas was an animal trader travelling with the intention of selling in the Fayum, this was a transaction of considerable value. It is less likely, but possible, that he owned the animals and intended to hire them out, as his payment of 88 drachmas 4 obols in tax is a significant expense, which would take some time to recoup. It is unlikely, given the date (August) that the animals were destined for state transport purposes, as it falls outside busy agricultural periods, and animals destined for such work would surely not have been subject to tax.

⁸⁹ Adams and Gonis, 'Two customs-house receipts', 214.

widely used in the desert regions and thus their breeding was more evenly distributed. Donkeys, on the other hand, seem to be more commonly exported, which may indicate that they were not widely bred in the oases.

Animals destined for trade may also have been used to carry provender for the caravan and its driver, and again, such loads were not subject to duty.⁹⁰ Such details are not generally included in the brief and formulaic texts which make up this corpus, but one important feature of the evidence for animal trade in the customs registers and receipts is that it is common, when animals are the object of trade, for them to be more fully described than those merely carrying goods.⁹¹

INVESTMENT IN ANIMALS

Now that we have considered aspects of trade in animals and animal ownership, we must consider the issue of investment in livestock. We have seen that in the rather unique village of Soknopaiou Nesos, individuals and families invested in camel stock rather than land, and this formed their patrimonium. The distribution of land in this village was peculiar, and thus forced this investment. But in other villages and in the cities of Egypt, were animals thought of as an investment? It seems clear that those individuals who specialized in the sale of donkeys thought so; but what of others? Given that we have established that the ownership of animals was not so widespread as we might imagine, due to their cost and maintenance expense, it is probably the case that any person investing in animals would come from the ranks of the city elite. There is some evidence in the camel sale documents to suggest this, and a number of examples will suffice here.⁹² In one text, the buyer of a camel at Dionysias, who comes from the metropolis Arsinoe, clearly intends to keep the animal at

⁹⁰ See the commentary to *BGU XIII 2309*, 8–9n.

⁹¹ N. Y. Clauson, 'A customs house registry from Roman Egypt', *Aegyptus* 9 (1928), 277.

⁹² Jördens, 'Sozialstrukturen', 72–3, treats this topic in detail.

Dionysias.⁹³ It is entirely possible that the two protagonists were business partners. Mindful of this, we should consider a later text in which two business partners seem to have drawn up a contract where one supplies animals (or capital to buy animals), and the other provides capital to purchase commodities for trade.⁹⁴ The complexity of ownership is illustrated by a camel declaration dating to AD 149, where a citizen of Arsinoe declares that he owns a herd of eight camels and two foals.⁹⁵ It is not clear where the animals are kept, but it is unlikely that they were kept in the metropolis for three reasons, first that their housing in stalls would be expensive (especially given the lack of pasture),⁹⁶ second, they would be a considerable distance away from where the transport work was taking place, and third, it is entirely possible that the owner of the camels also owned land close to Dionysias. It is likely therefore that they were housed in Soknopaiou Nesos or Dionysias, close to the desert routes and to suitably experienced camel-drivers, no doubt employed by the owner.

Equally, if the metropolitane owners of these camels were involved in long-distance trade, it is possible that camel stalls in the *metropoleis* also performed the role of warehouses.⁹⁷ Were these the individuals who were involved in the highly lucrative trade with the east, who owned camels and employed drivers for the difficult travel through the Eastern Desert? Could they also make profits from carrying goods between the valley and the oases of the Western Desert? There is little direct evidence, though as we shall see, there is evidence that city dwellers in the Nile Valley were involved in the eastern trade, as Alexandrian citizens certainly were. If this is the case, there is a definite link between the ownership and declaration of camels and trade throughout the province. Camels clearly dominated desert transport, but donkeys too were used, even for these journeys. In recent excavations at Berenike on the Red Sea coast, a papyrus was

⁹³ *P. Stras.* IV 201 (AD 162).

⁹⁴ *PUG* I 20, discussed in more detail below (Chapter 8).

⁹⁵ *BGU* VII 1582. Alexandrian citizens seem also to have been involved in such transactions, see *BGU* II 427 (AD 159) and II 469 (AD 159/60).

⁹⁶ Although, if the camel owner also owned agricultural land near the metropolis, it is entirely likely they may have been kept there, as was the case with the camels owned by Aurelius Appianus, see below (Chapter 9).

⁹⁷ There is some evidence for this at Memphis, see *P. Oxy. Hels.* 23 (AD 212).

discovered preserving the sale of a donkey at Berenike during the reign of Nero.⁹⁸ It would be interesting to know more about the circumstances of this particular sale, for it may have been practical and more economical for traders to buy animals before a particular trading venture and sell them afterwards, rather than keep animals which may not always have been fully used. This would represent a similar, economically rational approach to animal ownership which operated in the agricultural economy, when only the minimum number of animals were owned, and their numbers supplemented through hiring at busy periods of the year. Unfortunately our evidence falls short of our requirements on this issue.

BRANDING OF ANIMALS

The final consideration in this section is branding, of clear relevance to the sale of animals and ownership. The branding of animals is attested from the Egyptian Old Kingdom, when tattooing was used, and in the Graeco-Roman period, when brand marks or stamps are attested. Oddly, no mention is made of branding in the Roman agricultural writers: it is more usual for brands to turn up in military contexts or in the papyri from Egypt.⁹⁹ In animal sale documents, and in two customs-house receipts, brand marks are occasionally mentioned.¹⁰⁰ These served to identify animals and their owners, and, as Schnebel notes, were usually made on the shoulder or leg.¹⁰¹ Despite being such an obvious distinguishing mark, brands are attested very rarely in donkey sale contracts: in only four of the extant sales are they mentioned, although in a further document

⁹⁸ The text is as yet unpublished, but see S. E. Sidebotham and W. Z. Wendrich, 'Berenike: archaeological fieldwork at a Ptolemaic–Roman port on the Red Sea coast of Egypt 1999–2001', *Sahara* 13 (2001–2), 42.

⁹⁹ On the practice of branding in antiquity, see C. P. Jones, 'Stigmata: tattooing and branding in Graeco-Roman antiquity', *JRS* 78 (1988), 139–55, esp. 151.

¹⁰⁰ The two customs receipts are *P. Customs* 184 (with copies at 185–6), and Adams and Gonis, 'Two customs-house receipts', text I.

¹⁰¹ On branding practice, see Schnebel, *Die Landwirtschaft*, 334; Jördens, 'Sozialstrukturen', 83, n. 239; and Adams and Gonis, 'Two customs-house receipts', 216. On the branding of camels, see *P. Bas.* 2 intro. pp. 14–15.

a donkey is described as being without a brand (using the usual descriptive ἀχάρακτος).¹⁰² The branding of camels seems to have been more widespread, perhaps the explanation for this, and thus the uncommonness of donkey brands, is that camels are allowed to roam freely when grazing, with the natural result that brands were more important for identification, and that long-distance travel through desert, compared with local transport, also made branding necessary.¹⁰³ Proof of ownership in animal sales and declaration documents seems to be made by description of colour, age, and distinguishing marks such as scars, rather than a widespread use of branding.

It seems clear that the branding process used cauterizing, usually with letters, which might refer to the owner of the animal.¹⁰⁴ The brands were usually made on the right thigh, although variations include the right shoulder and jaw.¹⁰⁵ Although the character branded may refer to the owner, in a number of cases the brand mentioned can neither be connected with the name of the vendor or buyer,¹⁰⁶ and in others the characters connect to names so common that precision is impossible. However, given the detailed description of the animals and of any brands, marks, or scars they bore in the contracts of sale, it is likely that owners would be able to prove ownership through documentation rather than brand. In a number of cases, 'Arabic' brands are mentioned, and it is possible that these camels had come from outside Egypt, as clearly trade in camels took place over much greater distances than that of donkeys.

One final consideration is the branding of animals by the state, but our evidence is meagre indeed. In two instances, compulsory purchases of camels for military campaigns, brands are noted.¹⁰⁷

¹⁰² *SPP* XXII 101 (second century), where the brand ΠΙΟC is on the neck of the animal; *P. Mert.* III 106 (third century), which mentions a stamp (κόμμα); *SB* I 5679 (AD 307), for a mark (σημεῖον) on the shoulder; *P. Tebt.* II 419 (third century), a private letter asking for a donkey with a stamp (σφραγίς) to be sent to the writer. For a donkey ἀχάρακτος, see *P. Oxy.* XIV 1707 = *Sel. Pap.* I 33 (AD 204).

¹⁰³ On camel brands, see the list in *P. Vindob. Worp* 9 for details.

¹⁰⁴ For a παράσημον κωντήριον, see *BGU* II 469 (AD 159–60).

¹⁰⁵ For brands on the jaw, see *P. Oxy.* XLI 2998 and Adams and Gonis, 'Two customs-house receipts', text I. Brands on the lip seem unlikely.

¹⁰⁶ For example *P. Lond.* III 909a (p. 170) (AD 136).

¹⁰⁷ *P. Gen.* I² 35 (AD 161, with *BL* I, 162; IX 90; new edition) = Daris, no. 56; *P. Bas.* 2 (AD 190).

There is also a fleeting mention of brands on donkeys eligible for state grain transport. As we shall see, those individuals responsible for providing donkeys for this service were required by the state to supply three donkeys. There were often problems with the supply of these animals, for various reasons, and in one important document, the prefect Aemilius Saturninus writing to the *strategoï* of the Heptanomia and the Arsinoite nome states that liturgists were not supplying enough animals.¹⁰⁸ He orders that they are compelled to supply three donkeys, and that the animals be branded. The idea is to ensure that the required number of animals was provided, but also that the liturgists could be more easily detected if they did not perform their duties adequately. Without more evidence for this practice we cannot be sure if this measure was typical or unusually stringent, designed to address a particular crisis in transport. If donkeys destined for grain transport were commonly branded, then these must be the *δημόσιοι ὄνοι* mentioned often in transportation texts and discussed more fully in another section. The brand mark, however, must only have served to denote that particular animals were eligible to perform state transport of grain, for as the animals remained the personal property of their owners, the state could not claim ownership. The brand mark must have reflected this. The brand mark, finally, was certainly important to the return of requisitioned animals to their rightful owners.¹⁰⁹

CONCLUSIONS

In this chapter we have seen that trade in donkeys could become a specialism, and that sellers and buyers ranged over considerable distances to sell and buy animals. They did so in designated specialized markets, and they knew where these were. The breeding of animals too was the preserve often of those individuals who invested in animals (or large landowners, and, of course, they could be one and the same), and often took place near markets. Both

¹⁰⁸ *BGU I* 15 col. ii (AD 197?), with *BL I*, 8.

¹⁰⁹ An example of such return can be found in *P. Panop. Beatty* 2 ll. 153–5.

donkeys and camels were expensive, and we saw in the previous chapter that they were also expensive to maintain. For this reason, ownership was probably not as common as we might imagine, and strategies evolved for part-ownership, hire or simply borrowing animals. The tax registers from Karanis certainly suggest that the ownership of camels in the village was not widespread. But, animals could form an important investment, and this was especially the case with camels. The peculiarities of Soknopaiou Nesos and its priestly families aside, rich metropolitans could invest in transport animals and not only have a substantial asset in real terms (which had the advantage that it could expand through breeding), but it also allowed them the opportunity and ability to become involved in lucrative trading ventures. All of this made animal ownership valuable and important both to the agricultural and commercial economies within Roman Egypt, and it is understandable, therefore, that the state should wish to monitor and control ownership. It is to this which we now turn.

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Part III

The Organization of Transport

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State Control of Animal Ownership

So far we have considered animal trade and private ownership of animals. Although ownership may not have been so widespread as is generally assumed, it was certainly not the case that animals were uncommon. Donkeys and camels at least were a familiar feature of both the agricultural and desert landscapes of Egypt. They performed farm work and transport tasks of all kinds and were invaluable to the economy of Egypt, to farmers, and to those engaged in trade. It was inevitable that animal ownership would come under careful scrutiny by the state, for animals represented a valuable resource. Taxes could be placed on ownership, licence taxes charged for their use, and the state authorities could requisition animals for their own purposes. In the Roman period these included, most importantly, the transport of tax-grain, but also the provisioning of quarries and military units in the desert, the transport of military supplies more generally, and the provisioning of imperial and other official tours of the province, such as the prefect's *conventus*. Such demands necessitated a bureaucratic system that could enumerate the number of animals owned privately, record and monitor ownership, and, perhaps most significantly, ensure the prevention of fraudulent practices among administrators (more for the benefit of the state than the individual), a point considered more fully in the next section.

STATE BUREAUCRACY

Tight government control over animal ownership had its origins in the Ptolemaic period, if not earlier.¹ The registration or declaration of animals was required, but we should bear in mind that the purpose behind registration, and the use of the information so gained, may have been different between transport animals and other livestock. At any rate, a number of registration documents have been preserved, mostly concerning sheep: there are no registrations of donkeys or camels from the Ptolemaic period. The documents are conventional in form, and preserve the name of the owner, the number of animals he possessed, and the village or area in which they are to be found.² Very similar documents appear in the early Roman period, and it seems that the Augustan regime, after the annexation of Egypt, allowed for some continuity in practice. A number of property returns for animals date to this period, most importantly 10 documents found in the same cartonnage coffin from the Herakleopolite nome, all except one dating to 13 BC.³ The exception is *BGU XVI 2586*, dating to 5 BC, which registers the staggering number of 3200 sheep, 53 goats, together with their lambs and kids, under the name of one individual.⁴

¹ For the Pharaonic period, see C. Eyre, 'The village economy in Pharaonic Egypt', in A. K. Bowman and E. Rogan (ed.), *Agriculture in Egypt: From Pharaonic to Modern Times* (Oxford, 1999), 33–60, esp. 40, concerning cattle. Eyre stresses the point that we must not consider Pharaonic bureaucracy to be as efficient as Hellenistic or Roman, and cites W. E. H. Cockle, 'State archives in Graeco-Roman Egypt from 30 BC to the reign of Septimius Severus', *JEA* 70 (1984), 106–22, for 'the contrast between the dubious reference value of central archives and the power of documentation as a tool for administration at a local level'.

² See *P. Hib.* I 33 = *Sel. Pap.* II 321 (245 BC) for an example of a Ptolemaic property return of sheep. On registers of animals in the Ptolemaic period, see Schnebel, *Die Landwirtschaft*, 317.

³ *BGU XVI 2578–87* (13 BC); 2586 (5 BC). See also *P. Oxy.* IV 807 (AD 1), a fragmentary list of sheep owned by various individuals in an Oxyrhynchite village. If the date is correct, we have an interesting bureaucratic overlap between the Ptolemaic and Roman periods. Sheep which are privately owned are distinguished from those which were *Ἀρσινόες φορικά*, probably paying a special levy to the account of Arsinoe, which no doubt the Roman state authorities had subsumed.

⁴ See the introduction to *BGU XVI 2586* for parallel documents and, for bibliography, the introduction to 2578. It was usual for hundreds or thousands of animals to be registered by groups of animal owners or even villages. Individuals rarely declared in excess of hundreds of animals.

As the Roman period progressed, registration continued, with minor variations in practice and personnel. It follows from our evidence that the *strategos* and royal scribe, the senior nome officials, were ultimately responsible for monitoring animal ownership because it fell within their general responsibilities for the land economy, although it is likely that many of the associated tasks were devolved onto more junior officials and liturgists. Nearly all documents classed as *apographai* are addressed to these senior officials.⁵ But we should be mindful of the probability that administrative practices may have varied through time, may not have been the same throughout the different nomes of the province, and may have served several purposes, despite attempts to unify procedures.⁶ Indeed, it is difficult to reconstruct what the administrative procedures were, for there seem to be different types of declarations, perhaps in two tiers: first, the registrations of animals for particular taxes (which could then be compared with lists of receipts for the payment of each tax by individuals); and second, the registration of livestock as part of a monitoring process for the number of animals held in villages and nomes.

It would be useful to know how such documents were processed in the office of the *strategos* and royal scribe, but our evidence falls short. We do know, however, that copies of the documents were lodged in a registry office, the *grapheion*.⁷ These offices existed in each nome subdivision, or *toparchy*, and often for individual villages or groups of villages. A large amount of legal and administrative business was undertaken under the supervision of the *nomographos*, or notary, and copies of contracts and other documents were made

⁵ The fundamental work on *apographai* remains S. Avogadro, 'Le *ΑΠΟΓΡΑΦΑΙ* di proprietà nell'Egitto Greco-romano', *Aegyptus* 15 (1935), 131–206. See also C. Balconi, 'Le dichiarazioni de bestiame e il controllo del patrimonio zootecnico nell'Egitto romano', *Aegyptus* 70 (1990), 113–22.

⁶ The best example of a drive towards common practice is an edict of the prefect Mettius Rufus, preserved in a papyrus from Oxyrhynchus, *P. Oxy.* II 237 = *Sel. Pap.* II 219 (AD 89). See Cockle, 'State archives', 115.

⁷ On state archives, see Cockle, 'State archives'; on the *grapheion*, see R. H. Pierce, 'Grapheion, catalogue, and library in Roman Egypt', *Symbolae Osloensis* 43 (1968), 68–83. See also F. Burkhalter, 'Archives locales et archives centrales en Egypte romaine', *Chiron* 20 (1990), 191–216; and most recently, K. Maresch, 'Die Bibliothek der Enktesis im römischen Ägypten: Überlegungen zur Funktion zentraler Besitzarchive', *Archiv für Papyrusforschung* 48/2 (2002), 233–46.

and kept.⁸ Copies of these documents were prepared and sent, on a regular basis, to the central record office of the nome, the *βιβλιοθήκη δημοσίων λόγων* or *δημοσία βιβλιοθήκη*. A separate office for records of real property, the *βιβλιοθήκη τῶν ἐγκτήσεων*, seems to have been established in AD 72. It seems certain that this central office kept details of the ownership of all private property, in case of legal dispute and so that owners of property, which included animals, could prove ownership in the event of sale or dispute.⁹ In turn, these offices sent copies of their books to the central offices of Alexandria, and there is clear evidence, discussed below, that details of animal ownership were submitted.

We should start with a particularly important roster of evidence from Oxyrhynchos, which is central to this issue. In a unique papyrus from Oxyrhynchos, dating either to AD 283 or 285, we have some evidence for the working of the whole system, and from this document it is clear that a register of all livestock in the province was kept in Alexandria, and that in this matter, bureaucratic practice remained broadly similar throughout the three-century period with which we are concerned. The document contains copies of seven official letters, six addressed to the *strategos* of the Oxyrhynchite nome, and one addressed to the *strategoï* of several nomes.¹⁰

What remains of the letters is important: two are particularly so. The sixth letter concerns ‘the business of the mules’, for each of which the government was willing to pay 10 silver talents. We have already discussed this text in conjunction with the breeding of mules, perhaps for the army. The seventh letter concerns the maintenance of numbers of livestock in the villages of the nome, and their careful recording:

Aurelius Mercurius to the *strategos* of the Oxyrhynchite nome greeting. I have ordered a communication referred to me by Eugraphias and Agathos Daimon, the *officiales* of the *procurator usiacus*, to be attached for your information, in order that you may ensure that the number of livestock

⁸ On procedure, see E. Husselman, ‘Procedure of the Record Office of Tebtynis in the first century AD’, *Proceedings of the XII International Congress of Papyrologists, Ann Arbor, Michigan 1968* (Ann Arbor, 1970), 223–8.

⁹ See Cockle, ‘State archives’, 113–14.

¹⁰ *P. Oxy.* XIX 2228 (AD 283 or 285) (trans. Wegener). This is the largest example of such a dossier of documents from the Roman period in Egypt. The purpose of their collection is not clear.

bred and registered under each village may be maintained and that you make provision for careful attention to the breeding, making it known to me how you have acted. I pray for your health. The 2nd year, Thoth 9. The following is the copy: Since you have ordered us, my lord, to state in writing the sheep, donkeys, cows, horses, and camels found in the Oxyrhynchite nome in the charge of the *komarchs* and others, we have attached to this letter a detailed list, so that nothing may escape your attention. The 2nd year, Thoth 6. It is as follows: In the village of the Syrians with the *komarchs* 72 miscellaneous sheep, one lamb, 14 ditto goats, and in the hamlet of Annianus, which is in the territory of the village of Senao, with the people of the hamlet 6 miscellaneous sheep, 6 ditto goats, one full-grown cow, one calf.

This is the first certain evidence that the Roman state kept a detailed list of all livestock in Alexandria, seemingly in the office of the *procurator usiacus*, a financial administrator. As we would expect, the prefect of Egypt had direct access to this list, and from this he could make informed decisions about the numbers of animals to be requisitioned from each nome, even down to village level.

We should note from the document above that *komarchs* had animals under their charge. Some idea of how this more local stage of the system may have worked is provided by a document from the archive of the *komogrammateus* Petaus, which dates to AD 185.¹¹ In this papyrus, Petaus writes to the *strategos* of the Herakleides division of the Arsinoite nome giving him the name of an individual from the villages for which he is responsible who is eligible to provide a male camel, presumably for the kinds of state service mentioned briefly above. In order to provide this information to the *strategos*, it is likely that Petaus' office had referred to information kept in the village *grapheion*, and in order to corroborate details, the office of the *strategos* could check this information in property census records kept at the nome metropolis.

DECLARATIONS OF TRANSPORT ANIMALS

Having outlined above what is known about the organization of information, we turn now to the first part of the system, the declaration

¹¹ P. Petaus 82 (AD 185).

of animals. Only three donkey registrations are so far published from the Roman period, and they are addressed to tax collectors rather than state officials.¹² Thus they must represent a different category of document, probably directly linked to the tax to which they relate and, as such, compare with similar registrations of sheep for the pasture tax.¹³ They come from the Oxyrhynchite and Hermopolite nomes; none have so far been published from the Arsinoite. Other declarations follow particular conventions: they are generally addressed to the *strategos* and royal scribe; record the name of the owner; the year to which the declaration relates; the number of animals declared and sometimes how this differs from previous declarations, and if any births occurred in the present year; often where the animals are kept; the tax they are registered for; and usually end with a corroboration of the number of animals by an official.

The purpose of the registration was to ensure that owners paid the correct taxes levied on ownership. It was probably in an individual's best interests, then, to provide such detail, for if any animals had been requisitioned for state use, it is probable that he did not have to pay taxes on such animals during the period of requisition, and he also was afforded the opportunity to record whether animals were eligible for requisition.¹⁴ Second, the information provided by *apographai* and associated procedures provided the state with a 'database' of animals eligible for requisition or other uses. While certainly oppressive in spirit and detail, proper documentation afforded individuals some protection from the state.

CAMEL DECLARATIONS

The most valuable evidence we possess for transport animals relates to camels, but these depart somewhat from the usual form of declarations in that they do not seem to refer to a specific tax, but

¹² *P. Oxy.* XII 1457 (4–3 BC); *PSI* VII 785 (AD 93); and *SBI* 4516 = *W. Chr.* 205 = *P. Sarap.* 3 (AD 119–20).

¹³ See, for example, *P. Oxy.* LV 3778–9 (AD 21).

¹⁴ See *P. Lond.* II 328 (pp. 74–6) and *BGU* III 762 (both AD 163), relating to the requisition of camels.

rather provide a list of animals owned, and many also include bank *diagraphai*.¹⁵ This marks them very clearly as public, rather than private documents. All of the declarations so far published come from the Arsinoite Nome. Of these 42 declarations, 33 come from Soknopaiou Nesos, two from Arsinoe, two from Karanis, and the remainder unknown, but quite possibly Soknopaiou Nesos.¹⁶ The geographical weighting of the evidence is a concern: Préaux has noted that camel declaration documents were gathered together in the *grapheion* of Soknopaiou Nesos, which explains why they are found together and provide such strong evidence for camel declaration, ownership and sales in this rather unique village.¹⁷ Montevecchi correctly points out that the reason why these documents are clustered is that camels were the animals most frequently used in the desert, and that the village of Soknopaiou Nesos lay adjacent to the desert.¹⁸ It is not surprising, therefore, for these documents to have been found there. The two points are not contradictory, and neither should cause us worry.¹⁹ There is no reason why Soknopaiou Nesos should not dominate desert transport and camel ownership and sale, and this is some way confirmed if we take the risk of considering some arguments *ex silentio*. It was common, as Worp points out, for animal sales and declarations to be recorded by the state. With this in mind, it is interesting to note that in the lengthy *grapheion* registers from Tebtunis, there is no mention of any camel sale.²⁰ The case of Karanis, too, is interesting. It was a larger village than Soknopaiou Nesos, perhaps over twice the size in population at around 2000, but of all the camel-sale documents, only two individuals from Karanis sold camels,²¹ and ownership of camels, to judge by the lengthy tax registers preserved for the years 171–2 and 173–4, was not nearly so common: less than 20 inhabitants

¹⁵ Jördens, 'Sozialstrukturen', 64, n. 132.

¹⁶ A list of camel declarations can be found in Avogadro, 'Apographai', 133; with additions noted by Jördens, 'Sozialstrukturen', 65 n. 137.

¹⁷ C. Préaux, 'Vente de deux chamelles (P. Brooklyn gr. 3)', *CdÉ* 37 (1962), 158.

¹⁸ Montevecchi, 'Ricerche di sociologia', 42–3.

¹⁹ See the introduction to *P. Vindob. Worp* 9.

²⁰ Stated originally by Montevecchi, 'Ricerche di sociologia', 44.

²¹ *SPP* XXII 15 (AD 157) and *SPP* XXII 17 (second century). On the population of Karanis compared with Soknopaiou Nesos, see Hobson, 'P. Vindob. Gr. 24951 + 24556, 850 (SB XVI 12816).

owned animals, not 2 per cent of the population.²² The declarations are largely similar in form (with the usual small discrepancies of convention) to other declarations, and therefore must represent the norm.

Declarations of camels were made directly to the *strategos* and royal scribe of the nome in which the animals' owners lived. Where the full date of the documents is preserved, it falls within the first week of Mecheir (26 January–1 February), in which all registrations and the livestock census took place. This is in the period between the sowing and harvesting of crops, a comparatively quiet time in the farming year. The name of the declarant, his village of residence, notes concerning the number of animals declared in previous years, and how this number had changed in the present year, were recorded. The details were checked and double-checked in the offices of the *strategos* and royal scribe, and no doubt set against the details of the census of livestock. Thus state officials could keep track of the purchase of animals to increase herds, and here, no doubt, they could refer to contracts of sale kept in the record offices, and also note the deaths of animals, which was obviously a regular occurrence.

The earliest declaration of camels dates to AD 129, the latest to AD 216–17, and there is a fairly even spread amongst the intervening years. Given the context of the finding of the documents, in that most may come from the same find in Soknopaiou Nesos, it would be difficult to draw conclusions about the chronological spread. It would be tempting, however, to associate the documents with the general improvements made to the administrative system of Egypt during the reign of Trajan, especially in the realm of taxation.²³ With these in mind, we must turn to an interesting papyrus from Karanis, which preserves a collective return of camels for the village.²⁴ Whether this is part of the system of declaration under discussion here, or connected more directly to the transport of tax-grain is not

²² Jördens, 'Sozialstrukturen', 76, with n. 198. These figures tally with the evidence of *P. Mich.* IX 543 (AD 134–6) from Karanis, a declaration of camels made by a *καμηλοτρόφος* of 55 adult camels and 16 foals owned by villagers.

²³ See, generally, Sijpesteijn, 'Trajan and Egypt', with the comments of M. Sharp, 'Shearing sheep: Rome and the collection of taxes in Egypt, 30 BC–AD 200', in W. Eck (ed.), *Lokale Autonomie und römische Ordnungsmacht in den kaiserzeitlichen Provinzen vom 1. bis 3. Jahrhundert* (Oldenbourg, 1999), 227–8.

²⁴ *P. Mich.* IX 543 (AD 134–6).

clear, as it is our only example of a collective return. What can be said is that this is further testimony to the invasive nature of bureaucracy.

As mentioned above, there is no mention in any of the camel declarations of a particular tax for which they were registered, so we must here be considering a different category of declaration to those we have met before. We do have receipts for the payment of camel tax, and again most of these come from Soknopaiou Nesos, and it would be interesting to know how the documents related to each other.²⁵ There are 15 extant receipts for the tax on camels, the *τέλεσμα καμήλων*, dating from AD 141 to AD 216, and of these the majority come from Soknopaiou Nesos.²⁶ Both the camel declarations and receipts for camel tax are contemporary, and both may relate to changes in administrative practice. There is little doubt that they relate to each other, and that receipts for the payment of the tax could be compared with the details of ownership in order to detect defaulters.

THE CENSUS OF LIVESTOCK

The enumeration or census of herds and flocks is attested in the Ptolemaic period. This process is mentioned in a particularly important Ptolemaic papyrus, often referred to as a handbook of instructions on the duties of an *oekonomus*, a nome official in charge of financial and other matters. The *oekonomus* in question was instructed that he should:

Make a list of the animals used in both royal and private cultivation, and take the greatest care that the young of the royal animals, when old enough to eat fodder, be assigned to the animal stalls...

Since the revenue from the pasturage dues, too, is of the greatest importance, it will most easily be augmented if you carry out the registration of animals in the most efficient way. The best season for one so engaged is

²⁵ See R. W. Daniel and P. J. Sijpesteijn, 'Remarks on the camel tax in Roman Egypt', *CdÉ* 61 (1986), 111–15 for a list of documents and discussion. To the list of texts discussed here, add *P. Brook*. 14 (a re-edition of *BGU XV 2542*); *P. Bodl.* I 21 (a new edition of *P. Grenf.* II 48); and *P. Louvre* I 32 (AD 189).

²⁶ See Daniel and Sijpesteijn, 'Remarks on the camel tax'.

about the month of Mesore; for in this month, as the whole country is covered with water, it happens that animal-breeders send their flocks to the highest places, being unable to distribute them elsewhere.²⁷

This was certainly an ingenious use of natural topography to control the fiscal sphere. It allowed for efficient tax collection and enumeration. All animals, whether owned by the king or privately were to be accounted for and registered.

In the Roman period, the animal census was undertaken during an inspection tour of their nome by the *strategos* and royal scribe. They were accompanied by a man, known as the *ξένος*, selected by the *epistrategos* from another nome. His duty was to assist in the census and possibly to give the appearance of equality between the nomes and to assure impartiality on the part of the nome officials. Our evidence comes from three documents dating to the mid-second century.²⁸

From Spartacus son of Pausanias and Didyme, of the city of Oxyrhynchos. You sent me instructions to make the count of animals of the nome in the middle toparchy together with the royal scribe and the person appointed from another nome by his excellency the *epistrategos*, Statilius Maximus. Having therefore gone to the locality on Mecheir [date missing] I neither found any animals nor were they presented for counting.²⁹

The census was most likely linked to the registration of animals which, from the dating of the texts, took place in Mecheir before the census. The census therefore acted as a net to catch those who had failed to register their animals.³⁰ The evidence suggests that there was

²⁷ *P. Tebt.* III 703 = *Sel. Pap.* II 204 (late third century BC). The noun *κτῆνος* is used which should be understood in a broad sense as animals in general, rather than merely cattle in Hunt's translation.

²⁸ *P. Oxy.* XVII 2118 (c. AD 156), *P. Lond.* II 276 (pp. 77–8), and *P. Oxy.* XVII 2117 (AD 203). That the practice was ubiquitous is suggested by the appointment of commissioners from outside the nome assessed by the *epistrategos*.

²⁹ *P. Oxy.* XVII 2118 (c. AD 156). Why no animals were presented is not stated. AD 156 and 157 both saw poor Nile floods, so times may have been hard, causing a reluctance to pay taxes or perform liturgies, which were probably based on the census. See Bonneau, *Le Fisc et le Nil*, 247 for evidence relating to the floods in these years.

³⁰ Implied by, for example, *BGUI* 266 (AD 216). As noted, declarations took place in Mecheir. Where we have a date for a census, it is also in Mecheir.

a definite connection between the system of declaration, registration and the census. Appended to a document dating to AD 163 are details which link the processes, including a list of entries made by the *strategos*, royal scribe and *ξένος*, stating that the declarations of the camels in question had been made and agreed using their data.³¹ There is a question as to the regularity of the animal census. It is tempting to assume an annual pattern, for in a number of camel declarations reference is made to the census of the previous year. But the occasional lack of precision in the terminology employed, and the fact that the two dated censuses take place in the same month as the process of declaration, which surely does not leave enough time for the full census of a nome, suggest that the census took place only when suspicion as to the accuracy of declarations was raised and was therefore a bureaucratic check.³² Paucity of evidence allows for no definite conclusion.

After the census took place, the details gathered were deposited in the public record office (*βιβλιοθήκη δημοσίων λόγων*), and it seems that the *ξένος* had to submit his report to the record office of the nome in which he had taken part in the census. Good evidence for this comes from a papyrus from Oxyrhynchos, which preserves an acknowledgement that the details of the census of that year had been received in the public record office at Hermopolis:

[... , keepers of the public records of the Hermopolite nome,] to their dear friend... , of the city of Oxyrhynchos, appointed by his excellency Claudius... , *epistrategos*, to make a count of animals in the said nome, greeting. You have deposited with us a schedule of the count of animals you made for the present 11th year in this nome at the library of public records of the Hermopolite nome, through Achilles, assistant. We pray for your health, dear friend.³³

We have seen the link between two different tiers of bureaucracy. The declaration of animals, whether for tax purposes or otherwise, was made by the individual, and records were kept by the state.

³¹ *P. Lond.* II 328 (AD 163).

³² Suggested by Wallace, *Taxation*, 84. See *P. Lond.* II 328 (p. 75) for the use of the term *ἐξαριθμησίαις* instead of *ἀπογραφή*.

³³ *P. Oxy.* XVII 2117 (AD 203).

The animal census was a procedure organized by state officials and effected through them. They were responsible for submitting the right documents to the record offices. That they had ready access to all this information permitted the more efficient collection of taxes on animals, and easier requisition of animals for state service. Government officials knew exactly where to find animals, and they could keep track of those which had previously, or were currently, under service, those animals which were fit enough for it, and finally, those which were exempt.

TAXES ON ANIMALS AND TRANSPORT

Careful regulation of animal ownership allowed the state not only to requisition animals for its own transport requirements, but to place additional taxes on animal owners.

The tax we understand most fully is the *τέλεσμα καμήλων*, and is attested only in the Fayum from AD 141–216 on a number of documents.³⁴ All but one come from Soknopaiou Nesos, and this from Karanis.³⁵ But the tax is also mentioned in the second century Karanis tax lists. It appears to have been charged annually, and payment was made in the current or next tax year. It was clearly possible to pay in instalments, and, true to form, there appears to be a tendency to pay on the last days of any year. Taxes were paid to the collectors of money taxes (*πράκτορες ἀργυρικών*) of the village. In a number of cases, it seems that several receipts were kept together on rolls, possibly in the village registry office rather than by the owners—further evidence for documentary practice.

³⁴ *P. Grenf.* II 48 = *P. Bodl.* I 21 (double receipt, second text dated to AD 141); *BGU* XV 2542 = *P. Brook.* 14 (AD 148); *P. Lond.* II 319 (p. 80) (AD 157); *P. Coll. Youtie* I 40 (AD 159, with *BLVIII* 84); *P. Lond.* II 323 (p. 89) (AD 160); *BGU* II 654 (AD 161); *BGU* I 219 (double receipt, AD 161 and 163); *SPP XXII* 155 (AD 162); *P. Bas.* 12 (AD 167); *BGU* II 461; 521; III 770 (all AD 167); *SPP XXII* 108 (AD 186); *P. Louvre* I 32 (AD 189); *P. Hamb.* I 40 (AD 216). Also, *SB XIV* 11710, *BGU* I 199 (later than AD 192), and *P. Lond.* II 468 (p. 81) (either AD 154/5 or 177/8).

³⁵ *P. Hamb.* I 40.

A good example is the case of *P. Brook. 14*, where the receipts of a *καμηλοτρόφος*, Tesenouphis, were kept together in a roll, and what survives are payments made for the tax over two consecutive years (AD 148 and 149). He seems to pay each year's tax in two instalments: in AD 148 he pays 32 drachmas on Pauni 20 and a further 28 drachmas on Epeiph 25. In AD 149 he pays 36 drachmas on Epeiph 27 and two instalments of 20 and 24 drachmas plus extra charges (*τὰ προσδιαγραφόμενα*) on Mesore 26. The rate of tax seems to have been 10 drachmas per adult camel, plus supplementary charges at a rate of 6.25 per cent. The figure of 10 drachmas appears to have been the case in all of the extant receipts, and suggests that in this period there was a flat rate of 10 drachmas per camel, which indicates that it was a licence tax rather than an *ad valorem* assessment, as the value of camels varied according to their age and quality.³⁶ The one exception is *P. Lond. II 468* (either AD 154/5 or 177/8), which is a list of payments for the camel tax made by various individuals.³⁷ This records rates at variance with the 10-drachma rate seen in the other documents; indeed they are very irregular.³⁸ Wallace proposes that this document may come from outside the Fayum, where different rates of charge may have applied. Absence of evidence does not necessarily show absence, but the fact that all our documents come from the Fayum militates against Wallace's suggestion. Rather the payments probably represent instalments.³⁹

Taxes on donkeys are less well attested. Differently named taxes appear in documents from the Oxyrhynchite, Arsinoite and Hermopolite nomes, but it is likely that they represent the same tax in principle, which was subject to a different title and rate according to locality.⁴⁰ Differences in tax rate can also be explained by the much wider temporal distribution of our evidence in comparison with the tax

³⁶ See Wallace, *Taxation*, 89–90. For more recent discussion, see Daniel and Sijpesteijn, 'Remarks on the camel tax'.

³⁷ *P. Mich. IV 3380* has 75 drachmas, but is probably a scribal error.

³⁸ 11 drachmas, 5 drachmas 4 obols, 2 drachmas and so on.

³⁹ Suggested by analogy with *BGU XV 2542*, which preserves the first 15 lines of *P. Brook. 14*, but only includes the first instalment figure. The complete payments are only to be found in the Brooklyn text.

⁴⁰ Wallace, *Taxation*, 91.

on camels.⁴¹ There is a possible link to the *corvée*, the annual requirement of 5-days' work on irrigation channels and dykes, for in one document we see that one obligation of owners of donkeys was to provide them for this work.⁴² It was possible to commute this responsibility into a payment in cash or kind, and it is unclear if this and the tax on donkeys are one and the same. Wallace suggests that the paucity of evidence for the donkey tax may be explained by the possibility that owners preferred to provide their donkeys for *corvée* service, rather than pay tax. The absence therefore of any real tax on donkeys may represent a state-driven incentive to own animals, which could then be requisitioned.⁴³ Given the expense of buying and maintaining animals, there is good reason to doubt if any such initiative, if indeed there was one, would work in practice. Ultimately, there is not enough evidence for any clarity on these matters.

Another relevant tax is the *φόρος νομῶν*, the pasture tax, which we considered briefly above. Again, our understanding of exactly how this worked is incomplete, and a new and full survey of taxation in Roman Egypt may cast light on this and other matters of taxation on animals.

The final matter to consider, in relation to taxes on animals and travel, is the issue of the imposition of tax directly on travel. Customs dues naturally fall outside our remit, for they were charged *ad valorem* on the good carried, not on the physical act of transport. Our best evidence is well-known, the so-called Koptos Tariff Inscription.⁴⁴ This records charges made for the use of the road from Koptos to the Red Sea ports. These were flat-rate charges levied by the *alabarch*, under the auspices of the *Praefectus Montis Berenicidis*, and the ultimate authority of the Prefect of Egypt. Various groups of persons, ship's captains, sailors, artisans, among others paid a specific rate, and permits (*pittakia*), which bore a seal,

⁴¹ Our earliest evidence is *P. Oxy.* XII 1457 (4/3 BC) raising the question of whether the tax was a Roman innovation or based on Ptolemaic precedent. The remainder of our evidence is concentrated in the early to mid-second century AD.

⁴² *BGU* III 969 (AD 139?).

⁴³ Wallace, *Taxation*, 93.

⁴⁴ *OGIS* 674 = *I. Portes* 67 (AD 90).

were issued for a charge for camels. These must represent permits for the use of the roads which could be inspected at the various *praesidia* along the desert routes.⁴⁵ They are probably similar in nature to the passes issued at Mons Claudianus to individuals travelling between the various quarry stations there.⁴⁶ Sidebotham's suggestion that the proceeds of these charges were used to help defray the maintenance costs of the desert routes (essentially a re-investment) seems entirely plausible.

CONCLUSION

It seems clear then that the systems of declaration and census provided officials at local through to provincial level with the information that the state required to effect requisition and implement taxes. But we should not ignore the problems inherent in such bureaucratic systems. It is a common misconception that, given the complexity of bureaucracy in Roman Egypt, everything worked; more than often, it did not. While the state strove for the efficient and orderly keeping of records, and in many ways succeeded, it had less control on the use of information derived from them. There are certainly examples of failure in the system of information, but there are many more examples in the papyrological record of abuses of the system by officials.⁴⁷ The constant tinkering with administrative procedure and checking of officials was not so much directed towards a continual striving towards perfect procedure as much as a constant battle with fraud and

⁴⁵ See T. Pekary, *Untersuchungen zu den römischen Reichsstraßen* (Bonn, 1968), 164, n. 135, for the argument that the tax was charged for the permit, rather than the right to use the road, cf. Cuvigny, *La Route de Myos Hormos* ii 273.

⁴⁶ See *O. Claud.* I 48–82, intro.; Sidebotham, *Roman Economic Policy*, 79–81.

⁴⁷ The best-known example is *P. Oxy.* II 237 = *Sel. Pap.* II 219 (AD 89), an edict of the prefect Mettius Rufus concerning problems in the system of record keeping in the Oxyrhynchite nome. See Cockle, 'State archives', 121–2, for discussion of a good example of the failure in the keeping of papers in record offices evidenced by *P. Fam. Teb.* 15 and 24, and for his comments on the overall efficiency of the system.

abuse. Neither was the state concerned as much with the plight of individuals who may have been disadvantaged, as with losses that it might incur. N. Lewis describes the state's fear as not so much about officials 'milking the populace', but 'bilking the fisc'.⁴⁸ These concerns, and measures to stop abuses in administration, are best illustrated in the system governing the requisition of animals for public use.

⁴⁸ A phrase used by N. Lewis, 'On official corruption in Roman Egypt: the Edict of Vergilius Capito', *TAPA* 98 (1954), 154.

Animal Requisition

The requisition of animals for state use was not new to the Roman period. Animals had been requisitioned for the transport of grain in the Ptolemaic period as they were to be in the Roman; indeed state impositions made on private property were a very old concept indeed. We have looked in some detail at the bureaucratic system behind the requisition of animals for grain transport, but the system extended much further than this. It is well known that the Persian empire benefited from a postal or courier service, which operated through a system of relays passing on messages and letters to state officials. The Ptolemies also developed a postal service,¹ but there seems to have been a broadening of the term usually used to describe this service, ἀγγαρεύειν.² Not only letters and documents, but the transport of persons came to be included.

In the Roman period, such a transport system eventually developed into the *Cursus Publicus*, a precursor to which, according to Suetonius, was introduced by Augustus.³ This existed for the benefit of the military and state officials travelling around the provinces on business, and for the carriage of state documents. Its responsibilities did not extend to the transport of goods or commodities.⁴ From

¹ Shown by *P. Hib.* I 110 (c.225 BC).

² See generally M. Rostovtzeff, 'Angariae'; F. Preisigke, 'Die ptolemäische Staatspost', *Klio* 7 (1907), 241–77; Wilcken, *Grundzüge*, 374–6. More recently, see A. Kolb, 'Der *Cursus Publicus* in Ägypten', *Akten des 21. Internationalen Papyrologenkongresses: Berlin 13.-19.8.1995* (Stuttgart and Leipzig, 1997), 533–40; ead., 'Transport and communication in the Roman State: the *Cursus Publicus*', in Adams and Laurence, *Travel and Geography*, 95–105; and more fully, ead., *Transport*.

³ Suetonius, *Aug.* 42. 3–5.

⁴ P. Herz, *Studien zur römischen Wirtschaftsgesetzgebung* (Stuttgart, 1988), 60; Kolb, *Transport*, 227–47.

a modest beginning, this transport system was to develop into a complex web of routes throughout the empire with way stations, or *mansiones*, placed at regular intervals to provide food and lodging for men and animals.

REQUISITION IN THE PTOLEMAIC PERIOD

The requisition of animals in the Ptolemaic period, both for the transport of grain and of persons, was a commonplace. In many respects the demand for grain was every bit as important as it was to be in the Roman period, and there existed a complicated system of transport, the burden of which, as always, fell on the local population. As in the Roman period, property returns and an annual census of livestock, which usually took place during the Nile flood for ease of counting, formed the basis of the system of requisition. The king technically owned most property, whether land or animals, so in effect the people of the *chora* were stewards who enjoyed the use of such animals, but were obliged to provide them for grain transport or state demands when necessary. This system was directed from the highest levels of administration in Alexandria and was carried out through officials at nome level.

The nome officials had similar powers of requisition for animals required for state officials travelling around the country. An interesting document from Tebtunis in the Fayum, where most of our evidence for the Ptolemaic period originates, almost certainly concerns the transport of persons.⁵ In this, a man named Agathon writes to Patron instructing him to send a guard to the Arsinoite nome in order to requisition the best donkeys possible, and to send them to him in the city.⁶ The requirement that the animals be of the best quality only makes sense if they are to be used as mounts, and that they are to be delivered to the city, probably Arsinoe, also implies this.

⁵ *P. Tebt.* III 749 (c.243 BC).

⁶ See also *P. Tebt.* III 748 of around the same date, also requiring that donkeys be sent to the city, which suggests that they were not to be used for the transport of grain but for other purposes.

The most illuminating papyrus concerned with state transport, however, was found in Hibeh in the Great Oasis, but originated at an unknown location in the Nile Valley. It is a record of the arrival and departure of letters exchanged between the king and his high officials carried by messengers. Careful note is taken of the day and hour of arrival of each messenger, the clerk who received him, details of the packets and documents carried, and the name of the ongoing messenger. The name of the station is lost, but internal evidence suggests that it was in the Nile Valley: a village named Phebichis in the Kwites topos is mentioned and all directions of travel are to the north and south.⁷ No details are recorded concerning animals, but it is certain that the animals used were requisitioned and that demands were made on the local population to supply fodder for them. This system anticipated the later Roman *Cursus Publicus*.

As the Romans found later, any system of requisition was open to abuse. A papyrus from Tebtunis, dating to 118 BC, preserves details of *prostagmata* issued by Euergetes II granting concessions to various sections of the population—the gradual breaking down of royal control is evident.⁸ The kinds of abuse are clear; the king and queen decreed that ‘the *stratego*i and other officials shall not impress any of the inhabitants of the *chora* for private services, nor requisition their animals for any private purpose, nor force them to feed calves or sacrificial animals, nor force them to provide geese or fowls or wine or grain at a price, nor compel them to work without payment on any pretext’ (ll. 178–87).

Although the process by which officials could requisition animals remains obscure—none of our evidence is specific, and most relates to abuses in the system—we may assume that *stratego*i and *oikonomoi* had the authority to demand transport animals for state use.

⁷ *P. Hib.* I 110: see Preisigke, ‘Ptolemäische Staatspost’, for extended discussion; S. R. Llewelyn, ‘Did the Ptolemaic postal system work to a timetable?’, *ZPE* 99 (1993), 41–56; Kolb, *Transport*, 17–18.

⁸ *P. Tebt.* I 5 (118 BC), extracts are published as *Sel. Pap.* II 210 (trans. Hunt). The directions relate to particular offences perpetrated by supporters of Cleopatra, sister of Euergetes II, against the latter’s supporters. However, some of the indulgences provide for more common abuses such as the wrongful requisition of transport animals.

REQUISITIONED TRANSPORT IN ROMAN EGYPT

The requisition of animals was founded upon the complicated bureaucratic system which we have considered in some detail above. Using the information derived from property declarations and the annual census of animals, village scribes were able to put forward the names of those individuals who, in any given year, owned animals eligible for state requisition. This was important, not only so that the state could be certain that its requirements could be met (by far the most important consideration), and to provide at least an impression of equity in the apportioning of responsibility, but also to ensure that the correct animals were requisitioned from those responsible and the same animals returned to them after their period of service. Careful record was also essential for the few animals exempt from requisition, such as those owned by imperial estates. In one interesting bronze tablet we read that such an animal belonged to the Agrippinian–Rutulian estate of the emperor, and thus was subject to neither taxation nor requisition (*ἀτελεία*).⁹ This indicates that animals exempt from requisition had to be clearly identifiable.

Animals were requisitioned by the state for a number of purposes: for specific transport tasks such as the transport of quarried stone for imperial building projects, for the supply of state operations such as quarrying in the Eastern Desert, for the transport of officials around the province and for carrying their supplies, for state visits by the prefect or emperor, and for the use of the army. Numerous papyri relate to these phenomena, and a number of important inscriptions relate to abuse of the system. Requisition of transport has been the subject of much scholarly debate which has revolved around the two main points of the nature of the obligations placed upon the subject population, whether individual or group, and if any remuneration for the supply of animals was forthcoming. The arguments are complicated and depend upon ambiguous evidence. Most important is the edict of Germanicus, issued when he visited Egypt against the

⁹ See Wilcken, *Grundzüge*, 376 = *SB* I 4226. See also, G. M. Parássoglou, *Imperial Estates in Roman Egypt* (Amsterdam, 1978), 57–8, on *ἀτελεία* on imperial estates.

wishes of Tiberius in AD 19.¹⁰ Germanicus ordered (ll. 10–21) that ‘neither a boat nor beast of burden be seized unless it is in accord with the command of my friend and secretary Baebius, nor lodgings seized. For if it is necessary, Baebius himself will provide lodgings fairly and justly and for the requisitioned boats and beasts of burden I order that payment be made according to my decree.’ This has been taken to mean that, although the state paid for lodgings as it had in the Ptolemaic period, there had up to this point been no remuneration for the provision of transport animals. In an effort to appease the local population, Germanicus ordered that such payment be made.¹¹ That payment was made is also suggested by the slightly later edict of the prefect Lucius Aemilius Rectus dating to the year AD 42.¹² He stated that ‘no one is allowed to requisition (*ἐνγαρεύειν*) those in the *chora* or to ask for travelling provisions or anything else free of charge without my *diplomata*’ (ll. 2–4). Although animals are not specifically mentioned, which has prompted Wallace to suggest that only persons are referred to, the verb *ἀγγαρεύειν* can refer not only to persons but also animals, so its precise use here is unclear.¹³

Some seven years later it seems that the state was still concerned about abuses in the system of requisition. On the gateway of the Temple of Khargeh in the Great Oasis, an edict of the prefect Vergilius Capito is preserved in which he reiterates the position of the government: ‘Wherefore I command those soldiers, cavalrymen, *statores*, centurions, tribunes, and all the others who travel through the nomes neither to take nor requisition anything unless they have my *diplomata*.’¹⁴ Finally, in AD 133 or 137, the prefect Marcus Petronius Mamertinus issued an edict which stated that the *strategoï* and royal scribes in the nomes were not to provide transport for anyone who did not possess his *diploma*.¹⁵ The document suggests that transport was provided free of charge to those individuals

¹⁰ SB I 3924 = *Sel. Pap.* II 211 (AD 19) (trans. Hunt).

¹¹ E. J. Holmberg, *Zur Geschichte des Cursus Publicus* (Uppsala, 1933), 55–6.

¹² *P. Lond.* III 1171 verso = *W. Chr.* 439.

¹³ Wallace, *Taxation*, 153; on the use of the verb, see N. Lewis, ‘Notationes legentis’, *BASP* 30 (1993), 19–20.

¹⁴ *OGIS* 665 (AD 49). On this text, see N. Lewis, ‘On official corruption in Roman Egypt’.

¹⁵ *PSIV* 446 (AD 133/137). Pliny the Younger was certainly under similar constraints in his use of *diplomata*, see Pliny, *Ep.* 10. 45–6.

travelling on state business, but it seems that this was being abused by soldiers and others acting in collusion with the nome officials.

The fact that much of our evidence concerns correction of such action suggests that, first, such abuse was common, and second, more importantly, that the attempts by various prefects to correct abuses failed. They were symptomatic of a bureaucratic system in which officials experienced a major conflict of interest: how to weigh one's own welfare against that of the state. Poor pay for state officials, heavy demands, and compulsory service, could only serve to introduce a culture in which officials looked for perks and to exert their authority over those who possessed none.¹⁶ The frequency with which this malpractice occurred is implied in our literary evidence. The second-century-AD stoic philosopher Epictetus, in his *Discourses*, advised that 'if a requisition is taking place and a soldier takes [your mule], let it go, do not hold onto it, and do not complain. For if you do, you will get a beating and lose your mule all the same.'¹⁷ The hero of Apuleius' novel, in the guise of a donkey, was famously threatened with requisition, and there would be no comic value if this was not a recognizable phenomenon.¹⁸ Even emperors had sometimes to step in to ensure these endemic practices should cease. Claudius described the perpetrators of unlawful requisition as worthless men,¹⁹ and Domitian was forced to publish an edict forbidding it.²⁰ This gave sanction to the directives of prefects, but not force. It seems clear from the repetitiveness of edicts that abuse did not cease, and the threats meted out by prefects, although forceful, were largely hollow. The sentiments also are clear. Prefects were not so much concerned with the sometimes catastrophic effects that requisition could inflict on individuals, rather with attempts to defraud the state.

¹⁶ For similar argument in the tetrarchic period, see C. E. P. Adams, 'Transition and change in Diocletian's Egypt: province and empire in the late third century', in S. Swain and M. Edwards (ed.), *Approaching Late Antiquity: The Transformation from Early to Late Empire* (Oxford, 2004), 82–108.

¹⁷ Epictetus, *Discourses* 4. 1. 79. Soldiers, it seems, were the usual offenders, see S. Mitchell, 'Requisitioned transport in the Roman Empire', 114, with Pliny, *Ep.* 10. 78.

¹⁸ Apuleius, *Met.* 9. 39.

¹⁹ *CIL* III 7251 = *ILS* 214 = Smallwood 375, from Tegea (AD 49–50). See Kolb, *Transport*, 124.

²⁰ *IGLS* V 1998 = *SEG* XVII 755, with N. Lewis, 'Domitian's order on requisitioned transport and lodgings', *RIDA* 15 (1968), 135.

There are problems of interpretation, and such edicts designed to stop abuse do not necessarily concern themselves with or relate to details of how requisition actually worked. It seems clear that temporary requisition of animals was paid for, and that in the case of more permanent requisition, animals were bought under a compulsory purchase scheme, but in no case do we know how much was paid. The edicts merely order that abuses in the system are checked, and that no one should requisition transport or any other service without the permission of the prefect, with whom ultimate authority clearly lay. Animal declarations merely record that animals were requisitioned, but give no details of how or at what rate of pay. Payment for requisitioned animals was made in other provinces of the empire, which is stated in no uncertain terms in the famous edict of Sextus Sotidius Strabo Libuscidianus from Pisidia in Asia Minor.²¹ There may have existed in Egypt a bureaucratic system leading logically to compulsory public service, but this does not mean that payment was not forthcoming.

One important question is: what redress, if any, did an individual have in the face of administrative abuse? Prefect's edicts, and their demand that such edicts be published and set up in prominent places, could only go so far, and only showed an intent to do something about abuse. The reality was different. Private individuals experiencing mistreatment at the hands of state officials, and especially soldiers, found themselves in a difficult position.²² We possess one document which, although fragmentary and difficult of interpretation, sheds some light on this issue. It is a petition to the prefect Lucius Munatius Felix, and therefore dating to AD 150–1, from camel-owners from the Arsinoite nome (possibly Soknopaïou Nesos?), and also included is a copy of the minutes of the ensuing trial before the prefect.²³ The case concerns the requisition of camels from a man named Orseus and his

²¹ *SEG* XXVI 1392 (AD 19) l. 4, 'ne quis gratuitis vehiculis utatur'. For discussion of this inscription and the issue of requisitioned transport generally, see Mitchell, 'Requisitioned transport', especially 114, where he states that Germanicus' edict was directed at his own entourage rather than Egyptian officials.

²² On the favourable position enjoyed by soldiers in the legal process, see B. Campbell, *The Emperor and the Roman Army* (Oxford, 1984), 254–63, and specifically on Egypt, R. Alston, *Soldier and Society in Roman Egypt* (London and New York, 1995), 53–68.

²³ *P. Oxford* 4.

fellow camel-keepers (καμηλοτροφῶι) in his village, and revolves around the issue of whether the camels were bought (συνωπή) or hired (ἐπὶ μισθοφορᾷ). The text is badly damaged at its beginning and end, so details are difficult to establish, but it seems that the camel-keepers, represented by an advocate, are complaining that their animals had been subject to requisition but they had not been paid. It is not clear if the animals had been bought as part of an arrangement for permanent requisition, or had been hired. Most likely they had been ‘hired’ by the soldier, but no payment had been made. The soldier, through his advocate, seemingly claimed that the fault lay with the office of the *strategos*, claiming that he had requisitioned them through the *strategos*. We do not know the outcome of the case, but from it some details of the system of requisition can be derived, which will be discussed more fully below.

EVIDENCE FOR THE TRANSPORT OF PERSONS OR DOCUMENTS

There are few papyri that specifically relate to the transport of persons, but those that do are informative on a number of points. We do not have precise dates for the documents, but they range from the second to fourth centuries. The first, which may date to the second or early third century, is from Oxyrhynchos:

Paesius to his dearest Archelaus, greeting. The bearer of this letter is the captain [ναύκληρος] Panemouos; please see that his freight is embarked as quickly as possible, and let it consist as usual with what you have in hand and selected for lading. Send up the inspectors yourself to the examination, getting a donkey from the chief of the police. After this give him your best attention and let him see the granaries, and brief the overseers and other officials concerned, whose names have been given you by Harpocraton, in order that there may be no delay. My best wishes for your health, dearest friend.²⁴

²⁴ *P. Oxy.* I 63 (trans. Grenfell and Hunt). The identity of the official giving the orders is not stated, but it is possible, given the *strategos*' and royal scribes' charge of grain transport, that the orders came from such a senior nome official.

It seems from this text that officials engaged in any state business, in this case the weighing and measuring of tax-grain, were eligible for transport provided through the state. Another text from the early third century preserves the receipt for the provision of two donkeys from a *katasporeus* to an *ekboleus* in order to carry out public business, possibly the inspection of irrigation channels, a duty falling to these officials.²⁵ In a later text from the fourth century, we see again that chiefs of police were charged with providing transport for an official, on orders from a *speculator*.²⁶ In the third century and after, *komarchai*, or village elders, seem also to have had a role to play, which they probably took over from *komogrammateis* some time in the third century. They had access to all the information that the former scribes had at their disposal, and could allocate animals from those eligible to provide them.

In two short documents, orders are given by nome officials that donkeys, and in one case guards, be provided for individuals; a stipulation is made as to how far they should travel. In the first, donkeys are to be provided for a person 'as far as Pouchis', but unfortunately neither the name nor office of the writer is recorded, and there is no mention of from where the person was travelling.²⁷ Better is a similar text from Oxyrhynchos:

From the strategos to the *komarchai* and *archepodos* of Theresis. Supply two donkeys and a guard for the man who delivers this letter to you, as far as Memphis. I have signed it.²⁸

The strategos concerned must have been that of the Prosopite nome in which the village of Theresis lay. It is possible that Memphis was the final destination, but equally possible that the *komarchai* were to provide donkeys to Memphis, where fresh animals would be provided for an onward journey. This would bring Egypt into line with what we know to have been the system of animal provision in

²⁵ *P. Berl. Leihg.* II 34 verso. On the duties of a *katasporeus*, see F. Oertel, *Die Liturgie* (Leipzig, 1917), 188–9, and the introduction to *P. Petaus* 49.

²⁶ *P. Oxy.* IX 1193 (fourth century).

²⁷ *SB XIV* 12706 (third century), see H. C. Youtie, 'Ten short texts on papyrus', *ZPE* 23 (1976), 99 = *Scriptiunculae Posteriores* i 351.

²⁸ *P. Oxy.* XXXI 2577 (third or fourth century). The village of Theresis was probably in the Prosopite nome, see *BGU XV* 2543. The man delivering the letter may have been a resident of Oxyrhynchos working away from his nome.

Asia Minor and other provinces, where local communities were responsible for providing transport along certain parts or stretches of road in their vicinity.²⁹ It is possible that such an arrangement came into being after the reign of Hadrian with the extension of a system that already existed in Italy.³⁰

These documents illustrate one way in which letters and documents could be taken around the *chora*. Private individuals could simply ask others who were travelling in particular directions or to particular destinations to carry letters for them, which is shown well by a soldier writing to his wife from his base in the Eastern Desert, who took advantage of another travelling to the valley to carry his letter home, and himself planned to travel home using a provisions boat.³¹ There are numerous examples of such private arrangements, and a further one will suffice here: in a late-second-century letter written from a soldier to his mother, the expedient use of travellers to deliver letters (probably for a small consideration) is evident, the writer states that 'from Cyrene I encountered a man travelling in your direction (Karanis), and I felt it necessary to tell you about my well-being'.³² If the individual carrying a letter was unfamiliar with particular cities or villages, directions could always be given, as in one particularly interesting example from Oxyrhynchos, where despite clear directions instructions, the letter carrier was still advised to shout the name of the addressee on his arrival.³³ Such things were important for letters exchanged at distance, but most of the private letters preserved on papyrus were no doubt local in nature, and it is almost certainly the case that they were carried by individuals travelling between villages on foot, or by donkey-drivers hoping to supplement their incomes by carrying mail. The labour pool providing these animal-drivers will be discussed in a later section; it suffices to say here that they were probably seasonal transporters, using their animals at slack periods of the agricultural year.

²⁹ See *SEG* XIX 476 and *SEG* XVI 754, with Mitchell, 'Requisitioned transport', 121–2.

³⁰ See W. Eck, 'Die Laufbahn eines Ritters zur Apri in Thrakien: Ein Beitrag zum Ausbau der kaiserlichen Administration in Italien', *Chiron* 5 (1975), 365–92.

³¹ *O. Flor.* 14 (second century).

³² *P. Mich.* VIII 490.

³³ *P. Oxy.* XXXIV 2719 (third century).

But state documents were different, it was important that they arrive promptly and into the hands of the relevant officials. A little mentioned liturgy of letter-carrying (*ἐπιστολαφόρια*) which is attested in the second and third centuries existed for the purposes of state communication. Whether these liturgists had to provide their own animals or not is unknown; but, in one papyrus from the Fayum dating to the third century, a man wrote to his sister saying that his camel had been unexpectedly taken for the post-service, possibly for the use of letter carriers.³⁴ The liturgy is first attested in AD 136 and seems to have existed into the fourth century, when it was probably absorbed into the *Cursus Publicus*. Again we have an innovation dating to the reign of Hadrian, which we have seen is an important period of administrative change.

THE PROVISION OF TRANSPORT FOR OFFICIAL VISITS AND THE SUPPLY OF ANIMALS TO THE ARMY

Perhaps the most prominent purposes of requisition in our evidence are the demands of official itineraries through the province and the supply of animals to the army in both peacetime and war. In Chapter 6, we saw in a document from Oxyrhynchos that it was the duty of the *strategos* to keep up-to-date records of all animals and livestock in the villages within his nome, and here we need to consider how the procedure so mentioned fits into the system of requisition.³⁵ It is a letter from one *strategos* to another concerning the census of livestock, and seems to be a list of animals prepared by a diligent official, the implication being that the recipient was less so. He is instructed to take notice of the example, 'in order that you may see to it that the number registered under each village of livestock bred there may be maintained and that you make provision for

³⁴ *P. Fuad I Univ.* 6 (third century) possibly refers to this. On *ἐπιστολαφόροι*, see Lewis, *Compulsory Public Services*, 28; Thomas, 'Communication between the prefect of Egypt, the procurators, and the nome officials', 185–95; Kolb, *Transport*, 281–2.

³⁵ *P. Oxy.* XIX 2228 (AD 283 or 285).

zealous attention to the breeding, making known to me how you have proceeded'. This information was to be kept at hand in case requisitions needed to be made. In some circumstances these appear to have been effected through the office of the *epistrategos*, who may have been in charge of organizing such demands in his administrative district, which fits the role which has been identified for this official by Thomas; that the '*epistrategos* is concerned with the provision of personnel to put into effect a requisition, rather than with the requisition itself'.³⁶ In a papyrus dating to AD 199, an *epistrategos* requests information relating to the availability of livestock and produce in the Oxyrhynchite, probably for an impending imperial visit.³⁷ In another document, perhaps dating to AD 233, we have a record of a letter probably sent by an *epistrategos* to the *strategoï* of the Seven Nomes and the Arsinoite giving instructions concerning the visit of the emperor Severus Alexander and his mother, Julia Mamaea.³⁸ It mentions previous communication from the *epistrategos* concerning the schedule of requisitions. It seems that as the visit was imminent, the *strategoï* had to post up the letter of the *epistrategos* listing the requisitions to be made, and that these were not to be exceeded in any way.³⁹

So it seems that the basic requirements of an imperial or prefectural entourage were provided by local communities. The fullest information we have on the organization of supply is preserved in the extensive group of letters contained within *P. Panop. Beatty* 1 (AD 298), linked to the incipient visit of Diocletian to Egypt.⁴⁰ A bewildering number of liturgists were appointed to oversee the collection of a range of commodities, but unfortunately, there is little information on transport. We need to turn to other documents. A good example is a text from Oxyrhynchos, where camel-drivers are

³⁶ J. D. Thomas, *The Epistrategos in Ptolemaic and Roman Egypt: Part 2: The Roman Epistrategos* (Opladen, 1982), 169.

³⁷ PSI VI 683. On imperial visits to Egypt and other provinces, see F. G. B. Millar, *The Emperor in the Roman World*, 2nd edn (London, 1992), 28–40.

³⁸ SB XIV 11651 (AD 233?), with W. Clarysse and J. D. Thomas, 'A projected visit of Severus Alexander to Egypt', *Ancient Society* 8 (1977), 195–207.

³⁹ See Wilcken, *Grundzüge*, 84–5 for the posting up of similar letters regarding requisitions for the visit of Caracalla.

⁴⁰ For discussion, see N. Lewis, 'In the world of *P. Panop. Beatty* 1: "An army marches on its stomach"', *CdÉ* 79 (2004), 221–8.

required for transport work at an imperial palace at Memphis, and the Oxyrhynchite village of Tēis was obliged to supply a driver towards the nome quota.⁴¹ Other evidence concerns the supply of provisions, but clearly animals were needed to transport them.⁴² Our evidence, although limited in quantity, is informative, but unfortunately we have little evidence for the requisition of animals before the second century. Two camel-declaration documents dating to AD 163 preserve some details about the system.⁴³ In these it is recorded that camels were requisitioned to haul porphyry columns in the Eastern Desert, and that one was required for service on the caravans running between the Nile Valley and Berenike on the Red Sea coast.⁴⁴ The order to requisition was made by the prefect, and as we have seen, all requisitions in Egypt for transport or services had to be made with his permission. Animals were then selected according to the information possessed at village level. All state transport operations seem to have been organized in this way. A similar declaration, again from the village of Soknopaïou Nesos, was made by a woman named Aurelia Taesis in AD 216.⁴⁵ She claimed that two of her camels had been required for the visit to Egypt of Caracalla, on the orders of the prefect issued in the previous year, AD 215. In the year of declaration, one of the same camels was requisitioned for imperial service in Syria, while the other was rejected as being unfit. These requisitions were made for a limited duration—either for a specific purpose relating to a visit of the emperor or prefect, or for specific services, for periods of up to a year. In these instances the animals seem to have been ‘hired’ (ἐπὶ μισθοφορᾶ), where a payment (μισθός) was made to the owner of the animal for its service. The animals could be collected by soldiers, on the production of a *diploma* from the

⁴¹ *P. Oxy.* LV 3788 (AD 309).

⁴² For food, see for example: *P. Oxy.* X 1261; *P. Stras.* IV 245; *BGU XIII* 2211 (AD 192); *P. Oxy.* XLIII 3090 (AD 216) for the supply of calves for the visit of Caracalla; *SB XIV* 11651 (AD 233?) for the supply of goods for a visit of Antoninus, with Clarysse and Thomas, ‘Projected visit’; P. van Minnen and J. D. Sosin, ‘Imperial pork: preparations for a visit of Severus Alexander and Iulia Mamaea to Egypt’, *Ancient Society* 27 (1996), 171–81 = *P. Mich. inv.* 3627; *P. Lond.* III 902 (AD 129 or 130) = *SB XX* 15159, with Lewis, ‘Notationes legentis’, 29. This list is not intended to be exhaustive.

⁴³ *BGU III* 762; *P. Lond.* II 328 (p. 74).

⁴⁴ See Adams, ‘Who bore the burden?’.

⁴⁵ *BGU I* 266 = *W. Chr.* 245.

prefect, who would pay the owners, or the animals would be gathered together by the *strategos* of the nome, who was then responsible for payment.

If animals were not taken away by soldiers once they were chosen for requisition, they had to be collected. Several papyri preserve oaths made by individuals swearing to perform this particular service before or during the visit of the emperor. What we see in operation is a mature system founded upon the *metropoleis* of Egypt. But the roles performed were not necessarily new, indeed many of them existed at least in the second century and probably ran alongside direct collection by soldiers attested earlier, and there is good reason to suspect that if Egypt was now similar in terms of local self-administration in the *metropoleis* after Severus, substantial steps were being taken before this in administration which brought Egypt more and more into line with the rest of the empire before AD 200.⁴⁶ As the second century went on, more and more of the functions undertaken by state officials or soldiers began to be devolved onto liturgists. In the first document, a man swears to ‘assist the selected magistrates in receiving and delivering the animals being sent to Pelusium... of our lord and most manifest of gods, Antoninus.’⁴⁷ The other texts are similar, where individuals swear oaths to carry out their duties of collecting and delivering animals.⁴⁸ These requisitions were made from Middle Egypt for the visit of Caracalla, even though he did not travel outside Alexandria. The whole province was bound to provision the emperor, though Alexandria was likely to have been exempt.

Duties of collecting and delivering requisitions appear in the second century—there seems to be a move away from state administration of the system in an attempt to decrease the burden on government, probably a change brought into effect sometime during the reign of Trajan, which, as we have already seen, witnessed a number of administrative developments. It seems that at some point towards the middle of the second century, local notables, probably of

⁴⁶ For this, see A. K. Bowman and D. Rathbone, ‘Cities and administration in Roman Egypt’.

⁴⁷ *P. Oxy.* LI 3202 (AD 215).

⁴⁸ *P. Oxy.* LI 3202–4 (AD 215).

metropolitane class, became responsible for the collection and safe delivery of requisitioned animals. In *P. Oxy.* XVIII 2182 (AD 165), we see that persons known as *εὐσχημονες* escorted animals from the Oxyrhynchite nome to the Fayum in order to supplement animals transporting grain. In two other papyri, *εὐσχημονες* appear escorting camels requisitioned by the state.⁴⁹ It is not clear if these persons were required always to accompany animals, but that they did on certain occasions is shown by a papyrus from Oxyrhynchos in which they accompany a ship's cargo.⁵⁰ By the late third century at least, the system of conveying animals reserved for state use seems to have been well established.⁵¹ There is also the question of the collection of animals before their onward transport to where they were required. It appears that *euschemones* may also have been involved at this stage of the process, as in one document from the second or third century, one also acts as a *paralempetes* or collector. We should imagine here a system no doubt similar to that of the liturgy of collecting private donkeys mentioned above. Perhaps at sometime in the third century, a little known liturgy, the *ῥαβδουχία*, might have regularized the provision of escorts for requisitioned animals and should be viewed in the context of the proliferation of such impositions during the third century. It is attested as a service from the Ptolemaic period through to AD 373, but seems, as far as our evidence goes, to have become a liturgy during the reign of Gallienus (AD 260–8).⁵²

Animals and provisions were thus supplied from the nomes throughout Egypt—unfortunately, due to the survival pattern of our evidence, documents from Oxyrhynchos dominate. From the documents quoted above, we note that the animals were to be transported to Pelusium for Caracalla's visit, and would probably remain with his entourage for the duration of his visit. The animals

⁴⁹ *P. Bas.* 2 (AD 190); *P. Stras.* IV 245 (AD 216). On *εὐσχημονες*, see N. Lewis, 'Εὐσχημονες in Roman Egypt', *BASP* 30 (1993), 105–13, with Adams, 'Who bore the burden?', 180–2.

⁵⁰ *P. Oxy.* LX 4063 (AD 183).

⁵¹ Implied by *P. Oxy.* XII 1414 (AD 270–5) dealing with the election of conveyors of animals.

⁵² See Lewis, *Compulsory Public Service*, 44. See *BGU* I 244 (reign of Gallienus); *P. Oxy.* XIV 1750 (AD 306); *P. Oxy.* XIV 1626 (AD 325); *PSI* IX 1037 (AD 301) and *P. Lips.* 85–6 (AD 372–3).

and supplies were no doubt taken there by ship, which certainly seems to have been the case with military supplies, discussed below.⁵³

There is little doubt that the organization for the prefect's annual *conventus* was similar.⁵⁴ There is less evidence for these arrangements preserved on papyri, but what we have is instructive.⁵⁵ Orders seem to have been issued from the prefect's office in Alexandria to the *strategoï* of the nomes, who were charged with overseeing the collection of provisions and animals to transport them. The prefect visited the *metropoleis* of the nomes with his entourage which consisted of officials and soldiers—we know for example that in March AD 208, the prefect Subatianus Aquila visited the city of Oxyrhynchos in the course of his *conventus*.⁵⁶ Two years later, orders were sent out by Subatianus Aquila to the *strategoï* that supplies be gathered. Individuals were nominated in the *metropoleis* for the liturgies of supplying provisions and animals: we know of one man who took an oath of office 'for the duty of providing the animal and wagon teams for the auspicious visit of the illustrious prefect Subatianus Aquila in the current 19th year'.⁵⁷ This man, doubtless a member of the town council, had to requisition animals from those eligible, and to collect and deliver these animals for their transport duties. He would then have had to return the animals to their owners after their period of service. In order that the animals were returned to their rightful owners—and we know from an important document from AD 300 that this was done—animals must have been branded and careful descriptions taken, probably similar to descriptions found on contracts of sale.⁵⁸ In one camel-declaration

⁵³ See for example, *P. Oxy.* XII 1412 (c.AD 284).

⁵⁴ On the *conventus*, see O. W. Reinmuth, *The Prefect of Egypt from Augustus to Diocletian* (Leipzig, 1963), 78–9; in more detail, G. Foti Talamanca, *Ricerche sul processo nell'Egitto greco-romano* (Milan, 1974) i; and *P. Petaus* pp. 45–7.

⁵⁵ See *SB* VI 9617; *BGU* XIII 2211 (c.AD 192); *P. Leit.* 12 = *SB* VIII 10204 (AD 210–11); *P. Petaus* 45–7 (AD 185) for preparations for the visit of Longaeus Rufus; see also *W. Chr.* 412–15. On the sequence of visits suggested by *P. Oxy.* IV 709 (c.AD 50?), see Thomas, *The Roman Epistrategos*, 15–29.

⁵⁶ For soldiers accompanying the prefect, see for example *P. Oxy.* XLVI 3290 (AD 258–60).

⁵⁷ *P. Leit.* 12 = *SB* VIII 10204 (AD 210–11).

⁵⁸ On the return of animals and wagons, see *P. Panop. Beatty* 2 ll. 153–4 (AD 300); on the branding of requisitioned animals, see *P. Oxy.* XLIII 3109 (AD 253–6). On branding, see references in Adams and Gonis, 'Two customs-house receipts', 216, discussed in the previous chapter.

document, camels seem to be branded with the first letters of their owner's name, which would certainly facilitate their proper return.⁵⁹

More regular requisitions were made for state transport operations. There is good information preserved regarding the supply of camels for transport duties within the quarries of the Eastern Desert (briefly mentioned above and discussed further in another chapter), and for the transport of monolithic stone columns between the quarries and the Nile Valley. We have three papyri from the Fayum that mention such requisition. One dates from the reign of Hadrian, and is a demand for extra barley to be sent to supply animals in the Eastern Desert which are employed in the 'carrying down' of a 50-foot column from Mons Claudianus.⁶⁰ Two declaration documents from Soknopaiou Nesos record that camels were requisitioned to haul porphyry pillars in the Eastern Desert, and one camel was serving on caravans carrying provisions from the Nile Valley to Berenike on the Red Sea coast.⁶¹ It seems that such requisition took place on an annual basis, and given that reasonably large numbers of animals were required, the provisions caravan (*poreia*) alone may have constituted some 150 camels, this was an obligation which was felt by many animal-owners throughout Egypt—indeed few could have been spared the inconvenience. The requisition is made, as usual, on the order of the prefect, but the text suggests that this was a regular caravan service, as do recently published ostraca from Mons Claudianus.⁶² The quarries were worked throughout the imperial period, and were particularly busy during the reigns of Trajan and Hadrian, when massive building projects in the city of Rome were taking place. We know that the quarries were still operational in AD 214–15, as a text from Oxyrhynchos preserves a reply from the *strategos* of the Oxyrhynchite nome to an order of the prefect that grain be distributed, probably to soldiers, and that he will append details of what remains, including

⁵⁹ *P. Gen.* I² 35 (AD 161) (previous edition = Daris, no. 56). The camels belong to a woman named Tasoucharion from Soknopaiou Nesos, and the brand is TA.

⁶⁰ *P. Giss.* III 69 (AD 118?), discussed further in Chapter 9.

⁶¹ *BGU* III 762 (AD 163); *P. Lond.* II 328 (p. 74) (AD 163).

⁶² See the editor's discussion of *P. Lond.* II 328. For the *poreia* at Mons Claudianus, see *O. Claud.* II 245; 273; 278; 375; and 376, and below.

deductions already made for the supply of men and animals serving in the Thebaid and the Eastern Desert quarries.⁶³ It is likely that the quarries were not in continuous operation, so these obligations were similarly only made during periods of use.

To the provision of imperial visits we should add requisitions made for imperial campaigns or for particular emergencies within Egypt itself. Indeed, one-off requisitions could be made for any imperial project. These were a more permanent arrangement than the temporary requisitions discussed above, and for these animals were purchased (*κυρωσῆ*), presumably compulsorily.⁶⁴ Perhaps the best examples of such requisitions are those made for Caracalla's and, later, Valerian's campaigns in Syria. We have two papyri from Oxyrhynchos indicating that the campaigns were supported from Egypt. The first is an undertaking under oath of a landowner from the Oxyrhynchite nome who had been nominated by his village scribe to convey barley from Oxyrhynchos to Alexandria from whence it would be taken to Syria.⁶⁵ We have already seen that camels were requisitioned for the same campaign.⁶⁶ It was probably that barley was used to feed animals accompanying the army. Finally, a recently published, and very important text, *P. Yale* III 137 (AD 214–15), preserves a register of payments in cash and kind destined for Syria for Caracalla's campaign. Obviously all of the requisitioned goods would be transported to Syria on similarly requisitioned animals or ships. Later, Valerian's campaign in Syria was similarly provisioned, shown by another document from Oxyrhynchos preserving an undertaking by villagers to convey ploughing oxen to wherever they may be required in Syria.⁶⁷ It is interesting to note that the villagers

⁶³ *P. Oxy.* XLV 3243.

⁶⁴ See *P. Gen.* I² 35; *BGU* I 266 = *W. Chr.* 245; *P. Flor.* II 278; and *P. Würzb.* 9.

⁶⁵ *P. Oxy.* XLIII 3090–1 (AD 216–17), see also *BGU* I 266 = *W. Chr.* 245 (AD 216–17). See also *P. Got.* 3; *P. Stras.* IV 245 with J. Whitehorne, 'Did Caracalla intend to return to Egypt?', *CdÉ* 57 (1982), 132–5, cf. *BL* VIII 416; and *P. Oxy.* LI 3602–5. For discussion see T. Kissel, *Untersuchungen zur Logistik des römischen Heeres in den Provinzen des griechischen Ostens (27 v. Chr.–235 n. Chr.)* (St Katharinen, 1995), 108–10 and J. P. Roth, *The Logistics of the Roman Army at War (264 BC–AD 235)* (Leiden, 1999), 117–55. For the fourth century, see *P. Oxy.* XIV 1626 = *Sel. Pap.* II 361 (AD 324), for the requisition of animals for the visit of an unnamed emperor.

⁶⁶ *BGU* I 266 = *W. Chr.* 245 (AD 216–17).

⁶⁷ *P. Oxy.* XLIII 3109 (AD 253–7).

seem to have been responsible for taking the animals all the way to Syria.

Within Egypt itself, certain emergencies demanded that requisition be made quickly. One such emergency occurred during the reign of Aurelian, when the Fayum was invaded from Libya. The system of requisition is seen in operation in a number of texts. The *strategoï* were issued orders from the prefect, and in one case from a *corrector*, whose task it was to secure public order. The *strategoï* subsequently issued orders to the town councils, whose members were then responsible, as we have seen, for the collection and delivery of the provisions.⁶⁸ Every means of transport available was used, in one case a boat belonging to an Alexandrian linen transporter was hired by a member of Oxyrhynchos town council to transport wine for the soldiers serving under the *corrector* in the Fayum for an agreed freight charge.⁶⁹

One vitally important issue for the state in its requisitioning of animals was that they were fit and healthy. This was particularly so for military use, and animals were subjected to a veterinary examination before they were accepted.⁷⁰ A willingness to reject animals declared unfit is shown by a camel declaration from Soknopaiou Nesos.⁷¹ As we have seen, these animals were requisitioned on an annual basis to carry provisions and stone in the desert. The army also needed animals on a permanent basis, and paid a fixed price for such animals. Ten silver talents were paid for mules bred in the Oxyrhynchite nome towards the end of the third century, and it is likely that such animals were bred specially for the army. No doubt the cost depended on the quality of the animal, and there is some

⁶⁸ On *correctores* see *P. Mert.* I pp. 157–61. Texts probably relating to the invasion of the Fayum are: *P. Oxy.* XLIII 3111; XLVI 3290; XLVI 3292; and *P. Princ.* II 29.

⁶⁹ *P. Oxy.* XLIII 3111.

⁷⁰ See R. Davies, *Service in the Roman Army* (Edinburgh, 1989), 153–73, and generally, J. Lesquier, *L'armée romaine d'Égypte d'Auguste à Dioclétien* (Cairo, 1918), 349–75. There is considerable evidence for the requisition of animals for military purposes: *P. Flor.* II 278 (*BL Konkordanz* 70; *BL IX* 85–6; *BL XI* 81); *P. Amh.* II 104; *P. Grenf.* I 48 = *W. Chr.* 416; *P. Gen.* I² 35 (*BL I* 162); *BGU I* 266; *O. Stras.* 445; *P. Grenf.* II 51 (*BL I* 188; V 38); *PSI V* 465; *BGU II* 655; *SP XXII* 137 (*BL VI* 197); *Stud. Pal.* XXII 92 (*BL VI* 197 and R. W. Daniel, 'Notes on the guilds and army in Roman Egypt', *BASP* 16 (1979), 44); *P. Lond.* III 1171 verso = *W. Chr.* 439 (*BL VII* 89).

⁷¹ *BGU III* 762.

evidence that the government was prepared to negotiate the price paid, and that town councils were prepared to defend the interests of their nome populations in trying to get the best price possible.⁷²

Such purchases were still regarded as requisitions, as no doubt the price paid was below market price. The prefect, as in all requisitions, was the ultimate authority in his capacity, not only as commander of the legions in Egypt, but as the controller of finances. Perhaps the best evidence for this comes from an extensive group of letters belonging to a file of correspondence of an army officer based in Babylon, in which a letter is preserved which was sent to the *stratego* of 10 nomes:

For the occasion of the convoy, which I am about to undertake with good fortune, in accordance with the requisition of the prefect, either bring to Babylon in person, or send through one of your men, the camels which the prefect ordered—being male, sturdy, and fit for convoy work—with Julius Paniscus, *sesquiplarius*, who has been sent, so that when I have inspected the camels there, the price may be paid to the man sent by you.⁷³

Babylon was an important military base in the Roman period, and a legion seems to have been based there.⁷⁴ It probably served in this case as a staging point, perhaps for the onward transport of provisions and animals to other parts of Egypt or even other provinces. The other facets of requisition are present—the demands made of the *strategos*, who in turn is to provide an escort for the animals—but as the date is AD 203, the system of devolving organization onto the town councils does not seem to have fully developed into that which is clear in the important town council proceedings which we have preserved from Oxyrhynchos.⁷⁵

⁷² *P. Oxy.* XIX 2228 (AD 283 or 285).

⁷³ *P. Flor.* II 278 (AD 203) = Daris no 64, similar to *P. Gen.* I² 35 (AD 161; see Davies, *Service in the Roman Army*, 155–6.

⁷⁴ Alston, *Soldier and Society*, 36. See *P. Oxy.* XII 1414 (AD 270–5) for provisions being escorted from Oxyrhynchos to Babylon (?) or Alexandria.

⁷⁵ Similar adjustments to administrative changes can perhaps be seen on one such papyrus. *P. Oxy.* XII 1414 mentioned above may reflect the town council's uncertainty with the new cloth tax (*anabolikon*) introduced by Aurelian. On this tax, see J. A. Sheridan, 'The ANABOLIKON', *ZPE* 124 (1999), 211–17.

CONCLUSIONS

The system of animal requisition in Roman Egypt was founded upon a complicated bureaucracy which provided the necessary information to state officials to effect requisition. As in Ptolemaic Egypt, nome officials had the right to requisition, but only with the authority of the central government which was always concerned with the level of abuse. During the second century, probably under Trajan or Hadrian, important administrative changes took place which gradually brought Egypt into line with the other provinces of the empire, in that more and more of the burden of organizing requisition fell on the local population. Nome officials were still charged with ordering requisition, but local notables were, through liturgical service, responsible for the collection and delivery of animals and provisions to the state. This anticipated the developments of the early third century under Septimius Severus, which saw the devolution of such responsibilities onto town councils, on order of the nome officials.

Egypt was a rich province and provided provisions and animals for important military campaigns in other provinces. It was not free from military problems itself, and one-off requisitions were often made on the population to provide for the army in such matters. Long-term and permanent requisitions of animals were often made, and the state was prepared to pay a fixed price for each animal. While animals such as mules were perhaps specially bred for this purpose, others were not, and thus individuals may have been required to sell animals for much less than their value. This and other annual requisitions meant that few animal-owners would ever have been spared the inconvenience and expense of having their animals requisitioned by the state.

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Part IV

Case Studies

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State Grain Transport

INTRODUCTION

Egypt is often said to be the granary of Rome. Tacitus writing in the early second century claimed that it was because of Egypt's wealth in grain that Augustus wished to keep direct control of the province in his own hands.¹ Tacitus is anachronistic here, for in the early imperial period Egypt's grain was arguably less important than Africa and Sicily. However, Augustus was no fool and was sensitive to the instability that could occur in Rome if the grain supply was threatened or disrupted in any way. Claudius later was to experience similar problems.² The food supply of Rome was an important political consideration for the emperors, and as Egypt came to supply a significant amount of grain to Rome, if not the greatest proportion of it, its efficient and punctual arrival in Rome was of prime concern and came under the control of imperial officials who headed a complicated and multi-faceted logistical system.³

Within Egypt itself, the importance of grain to Rome is reflected by the huge bureaucratic effort to which the government was prepared to go to ensure its efficient transport.⁴ Indeed, grain transport is by

¹ Tacitus, *Histories* 1. 11.

² Suetonius, *Claud.* 18.

³ See generally G. Rickman, *The Corn Supply of Ancient Rome* (Oxford, 1980); A. J. B. Sirks, *Food for Rome: The Legal Structure of the Transportation and Processing of Supplies for the Imperial Distributions in Rome and Constantinople* (Amsterdam, 1991).

⁴ There is a significant amount of relevant literature: the most important is M. Rostovtzeff, 'Kornerhebung und Transport im griechisch-römischen Ägypten', *Archiv für Papyrusforschung* 3 (1906), 201–24; F. Preisigke, 'Kornfrachten im Fayum', *Archiv für Papyrusforschung* 3 (1906), 44–54; *P. Hamb.* 1 33 intro.; Wilcken, *Grundzüge* 378; M. San Nicolò, *Ägyptisches Vereinswesen zur Zeit der Ptolemäer und Römer*

far the most highly attested form of state transport, which is almost certainly not an accident of preservation. The importance of grain in Egypt was not new to the Roman period. The Ptolemaic kings had developed a transport system on which the Romans were later to build. They recognized the importance of grain, and it provided them with the means to pay and attract mercenaries to their service, and provided an important export commodity.

The organization of grain transport in Roman Egypt was largely dependent upon geographical location. The Nile provided the most important transport artery, and a highly organized system of transport existed for carrying tax-grain from the Nile ports to Alexandria (other major cities were, no doubt, supplied in a similar manner).⁵ Canals not only carried water for the irrigation of fields, but in many cases were also navigable by barges carrying grain. There is no evidence for how these barges were drawn, but it is likely they were pulled by animals hauling from the level pathways on their sides.⁶ In the narrow Nile Valley, where distances to granaries and ports were small, and where canals existed, transport was easy. Further away from the Nile, and especially in the Fayum, transport by land took on a greater importance, relative to distance from the Nile or canal. This is well illustrated by a papyrus from Tebtunis, preserved in two fragments and dating to the late second century BC:

At Kerkeosiris, which is unguarded and is not situated upon the Great River nor any other navigable stream, and is 160 stades distant from Ptolemais Eurgetis the metropolis of the nome and 159 stades from Moeris, where there is a guarded point nearby, the corn collected is transported to the royal granary in the village, an extra payment of 3 artabas on every 100 being made for the cleaning and sifting and one of 2 artabas on every 100 extra measure...[second fragment] It is transported there by pack animals

(Munich, 1972), ii 113–17; Oertel, *Die Liturgie*, 117; H. Thompson, *The Transport of Government Grain in Ptolemaic and Roman Egypt*, PhD thesis (Michigan, 1929); E. Börner, *Der staatliche Korntransport im griechisch-römischen Ägypten* (Hamburg, 1939), 19.

⁵ In addition to the basic works already cited, on river transport see, Meyer-Termeer, *Die Haftung der Schiffer*; D. Thompson, 'Nile grain transport under the Ptolemies', 64–75.

⁶ Any modern visitor to Egypt will clearly notice paths alongside canals, and often animals using them.

to...in the Herakleopolite [nome]...to Alexandria...8 artabas on every 100 for...the village...⁷

In the case of the Fayum, then, land transport by pack animal assumed a much more important role in the system of grain supply than in other parts of Egypt, and it is no coincidence, therefore, that the majority of papyri relating to the transport of grain by land come from the Fayum. But land transport remained an important part of the system of grain transport in other parts of Egypt, for barges and granaries had to be filled—pack animals performed a vital role in these regions too. There is good reason, therefore, to discuss the process of land transport in isolation from shipping and its organization.

PTOLEMAIC BACKGROUND TO THE TRANSPORT OF GRAIN BY LAND

As the Ptolemies faced the same difficulties of transport as the Romans after them, we need to survey the system of grain transport which they developed.

The harvest of grain took place during the months of Pharmouthi and Pachon (April and May), when all grain was taken to the village threshing floors, normally located on derelict or unproductive land.⁸ The delivery of the crops to the threshing floor was the responsibility of the cultivator, and was supervised by the harvest guards, the *γεννηματοφύλακες*, who were probably performing this function as a compulsory duty under oath.⁹ There is some dispute as to whether

⁷ *P. Tebt.* I 92 (late second century BC) (trans. Shelton); second fragment: *P. Tebt.* I 161 = *P. Tebt.* IV 1102 (116/5 BC).

⁸ Crawford, *Kerkeosiris*, 47. On the collection of grain taxes, see Z. M. Packman, *The Taxes in Grain in Ptolemaic Egypt: Granary Receipts from Diospolis Magna 146 BC–88 BC* (Toronto, 1968), *passim*.

⁹ See *P. Tebt.* I 27 i–iv on the appointment and duties of harvest guards, with Rostovtzeff, 'Kornerhebung', 204–5; Börner, *Die staatliche Korntransport*, 7; H. Cuvigny, 'La surveillance des récoltes (*γεννηματοφυλακία*)', *CdÉ* 59 (1984), 123–35. See also *P. Hamb.* I 27; *P. Magd.* 1; *P. Petr.* II 2; *PSI* IV 344; *PSI* V 490 (all third century BC); for the second century see *P. Tebt.* IV 1135. There seem to be only two references to these officials from the Roman period: *P. Petaus* 70 (second century) and

cultivators were allowed to take produce from the threshing floors until the state had collected its revenue. The view of Rostovtzeff, based on the provisions made in *P. Tebt.* I 27, was that the state exacted its dues at this point, but this has been doubted recently on evidence from the dating of granary receipts.¹⁰ These show that payments were regularly made in instalments, which would indicate that the state did not take full payment when grain was on threshing floors. After the grain was threshed, it was transported to the village granary by the cultivator, where it was received by *sitologoi* and a receipt issued. At the granary the grain was cleaned and sifted (*κάθαρσις* and *κοσκίνευσις*), if not already done on the threshing floor, for which a charge was made that varied according to the type and condition of the crop.¹¹ The grain was then stored in bins according to the year of harvest in order that older grain could be transported to the river first.¹²

The next stage of the process was the transport of grain from the granaries to harbours on the Nile or its tributary canals. This was called the *καταγωγή* or 'carrying down', and this term continued to be used in the Roman period.¹³ *Sitologoi* drew up reports of the transactions made in grain, carefully recording both what was being taken into the granaries and what was going out. These reports also recorded charges made for cleaning and sifting and payments made for transport (*φόρετρα*). When canal transport was not available this stage, transport was performed by donkeys and their drivers. Camels, as we have seen, were not yet playing any significant role in the transport process.

The standard view, largely championed by Rostovtzeff, was that donkey-drivers and their animals were formed into guilds or associations of transporters in order to carry out the transport of grain. The text which formed the basis of the argument was a rather

P. Ryl. II 90 = *Sel. Pap.* II 343 (early third century), which also mentions a no-doubt similar liturgy, the *άλωνοφυλακία*.

¹⁰ See Packman, *Taxes in Grain*, 59–63.

¹¹ The normal charge for cleaning and sifting was 5 per cent, but in practice this rate varied, as in *P. Lille* 20 where the payments are between 2 and 4 per cent, and *P. Tebt.* I 93 and 94, which record 5 per cent on wheat and 8 per cent on barley.

¹² See *P. Lille* 123 (222 BC).

¹³ See *P. Petr.* III 129.

lacunose document from the Arsinoite dating to the first century BC.¹⁴ This is a request from one Onnophris, who styles himself *γραμματεὺς κτηνοτρόφων Βαχιάδος* (secretary to the animal-owners of the village of Bakkias), to the *sitologos* of the same village for the payment of four artabas of wheat to an individual for *phorettron*. Rostovtzeff held that the guild was here being represented by its scribe, and that the text certainly refers to the transport of state grain, as a *sitologos* is petitioned. While there is little reason to doubt that the request does relate to the transport of state grain, Rostovtzeff's opinion that we are here dealing with a guild is doubtful. The term guild is too rigid in its meaning and usual application to be used here. In order to facilitate payment, donkey-drivers from the same village seem to have grouped themselves together; and this would certainly have made matters easier for the government in terms of payment. As many, if not all, of the donkey-drivers would have been semi-illiterate at best, it is not difficult to accept that, in order to request payment or to petition officials, they would have had to act through a scribe. Also, in this case a petition is made through a scribe for a single individual, showing that drivers could act independently. The fact the scribe normally acts for the drivers is all that we should read into his description of himself, which should not be understood as a formal title. This view is further supported by the case of a driver who was literate making a petition on his behalf and of other drivers—and was therefore not acting through a guild.¹⁵ We need not necessarily assume therefore, that they formed a 'guild' in a strict sense, a pattern which, we will see, was repeated in the Roman period, and to which we will return later. Donkey-drivers were therefore employed as groups from villages to carry grain from granaries to harbours, for which they received payment in kind from the *sitologoi*. The cost was met, not by the state, but by the cultivator.

Although *sitologoi* were important to the operation of grain transport at some level, given the importance of grain to the Ptolemaic state, direction for the whole process came from the highest echelons

¹⁴ *P. Fay.* 18 (b), with corrections at *BL* II 54. See Rostovtzeff, 'Kornerhebung', 210. In *P. Petr.* II 25 (i) Rostovtzeff finds an earlier example of such a guild, but his interpretation can be doubted.

¹⁵ *P. Petr.* II 25 (f).

of administration in Alexandria. The chief administrative official, the *dioicetes*, had a general oversight of the transport system. There is little doubt that the *dioicetes*, acting on the forecasts of harvests made from Nilometers,¹⁶ set the amount of tax to be paid in each year in kind, and gave the nome officials the general instructions on when transport was to begin and what rate transporters would be paid. It would show too much financial independence on the part of local officials if they had the authority to set rates of pay. The authority of the *dioicetes* in these operations is shown by the famous papyrus from Tebtunis preserving instructions to an official, possibly the *oekonomus*, a financial official at nome level.¹⁷ He is warned to:

Ensure that the corn in the nomes, with the exception of that apportioned on the spot for seed and that which cannot be transported by water, be brought down... It will then be easy to load the corn on the first ships arriving; and devote yourself to such matters carefully and attentively.

The *oekonomus* carried out these duties through subordinates, an ἐπιμελητής or overseer, and the more junior officials, *sitologoi* and guards. *Nomarchs* too had a function, and were often involved in the purchase of grain at a fixed price, an additional burden on the population.¹⁸

In extraordinary circumstances the *dioicetes* could authorize emergency action to be taken. In one papyrus from Tebtunis dating to 208 BC, the *dioicetes* orders that all beasts of burden in the Arsinoite nome, with the exception of those needed for ploughing, be used for the transport of state grain, which had been suffering delays.¹⁹ Another document from 120 BC records similar problems, where a representative of an official whose title, if he had one, is lost and who is merely stated to have had charge of forwarding grain, issued the order to 'put at the disposal of the *sitologoi*, with regard to the transport of the grain down to the harbours, all the beasts of burden [?] in the districts under your supervision... and if necessary,

¹⁶ On the role of Nilometers, see Strabo 17. 1. 48. On hydraulic society, see Butzer, *Early Hydraulic Civilisation* and, more broadly, Wikander, *Handbook of Ancient Water Technology*.

¹⁷ *P. Tebt.* III 703 (late third century BC).

¹⁸ *P. Lille* 53 (third century BC).

¹⁹ *P. Tebt.* III 704 (208 BC).

the animals employed on the threshing floors'.²⁰ For this to be possible, the state needed to have an accurate record of animal ownership; it is clear that they did.²¹ In emergencies, animal-owners could be approached individually, and we have some evidence of this. In a letter from a *sitologos* to one Dionysios, it is apparent that the latter is to provide, with a colleague, 100 donkeys for the transport of corn. The fact that Dionysios was approached individually shows that we are dealing with an emergency, and we need not assume that this was the normal procedure.²² However, such a large number of animals was beyond the scope of an individual to provide, so it would be interesting to know what exactly the status of Dionysios was.

The administrative system, then, had a hierarchy extending from the very top administrative levels in Alexandria, through nome officials such as *nomarchs* and *epimeletai*, to the humble *sitologoi*. The system does not appear to have been static, and thus it is not possible to provide an encompassing description. Additionally, during emergencies, ad hoc arrangements could be made. The prime concern of all officials was that the grain should reach Alexandria at the appointed time.

GRAIN TRANSPORT IN THE ROMAN PERIOD

It is difficult to ascertain exactly what similarities existed between the Ptolemaic system of grain transport and that of the Romans, but as in other matters, it is probably wrong to exaggerate the level of continuity between the two periods. Arguably the most noticeable difference, at least for the cultivators, was the new opportunity to own land. This would have triggered major changes in the system of tax collection, and the general impression given by our evidence, both

²⁰ *P. Stras.* II 93 (120 BC).

²¹ See *UPZ* 110 (164 BC), with Crawford, *Kerkeosiris*, 94.

²² A similarly large number of 73 donkeys is provided by a donkey-driver named Athenogenes in *P. Enteuxeis* 38 (222–1 BC). Börner, *Die staatliche Korntransport*, 17, takes these to be contracts for the provision of animals exchanged between *sitologoi* and individuals. It seems unlikely, however, that *sitologoi* would have such authority, and the texts themselves do not preserve any legal arrangements.

literary and papyrological, is of a large-scale tightening-up of administrative processes. The difference to the land and its irrigation channels was also noticeable to all, if we are to believe Strabo's comments about 'setting things right'.²³ Under the later Ptolemies, the infrastructure of the agricultural economy had been allowed to fall into disrepair. It remained for Augustus to organize its revitalizing, largely through hard physical labour on the part of soldiers.²⁴ Many features, however, remained the same as before, but there was certainly no question of the system being static. The gradual expansion of the liturgical system ensured this. Officials may have come and gone, as we shall see, for example, in the case of *sitologoi* and *dekaprotoi*, but the burden on the local population remained the same. Liturgical service in transport became onerous, and increasingly the state relied on liturgists, and later town councils, for the running of the transport system, under supervision of varying efficacy from nome officials, and, of course, the ultimate control of the prefect in Alexandria. The development, sometime in the second century, of the office of *Procurator Neaspoleos* added another level of bureaucracy. It is clear that the procurator assumed responsibility of transport of tax-grain by river, but as is often the case, the boundaries of responsibility were often flexible, and there is evidence for the procurator ordering transport by land.²⁵

TRANSPORT OF CROPS TO THRESHING FLOORS

The first stages of grain transport seem similar to those in the Ptolemaic period. The cultivator was responsible for the transport of grain from fields to village threshing floors by whatever means were available to him. Typically this may have been by human portage or pack animal, and in this latter case it was possible that those cultivators who could not afford to keep their own animals

²³ Strabo 17.1.13, although Strabo's account is certainly coloured with Roman propaganda.

²⁴ Suetonius, *Aug.* 18; SHA, *Probus* 9. 3–4, for similar issues in the third century.

²⁵ See *P. Oxy.* X 1259 (AD 211/2) and *PSI* IX 1053 (second or third century), from Oxyrhynchos.

may have hired or borrowed for the occasion. There seems to have been one exception to this rule. In the case of *δημόσιοι γεωργοί*, or state cultivators leasing land owned by the state, if necessary the government would provide transport for which a charge was made.²⁶ Tenants on imperial estates may also have paid these charges. This implies that private cultivators were responsible for organizing their own transport. The issue, however, is complicated by the probability that practices between *nomes* differed, and changes were made in the system over the first three centuries of Roman rule. Much detail in our knowledge of these is incomplete, for although we have many relevant documents, there are many questions which must remain unanswered.

The charges made for transport of wheat from crown land were known as the *δραγματηγία* and *σακκηγία*.²⁷ The former, according to one interpretation, related to the transport of sheaves to the threshing floor, the latter to the transport of sacks of grain to the granary.²⁸ However, it is possible that the two charges were made for the same operation—that of transport to the threshing floors—but that one was for the transport of sheaves, the other of ears of corn.²⁹

²⁶ On these cultivators in the Ptolemaic period, see J. Rowlandson, 'Freedom and subordination in ancient agriculture: the case of the *basilikoi georgoi* of Ptolemaic Egypt', in P. A. Cartledge and F. D. Harvey (ed.), *CRUX: Essays Presented to G. E. M. de Ste Croix on his 75th Birthday* (London, 1985), 327–47. Changes in definition and status took place in the Roman period, see Rowlandson, *Landowners and Tenants*, 93–7.

²⁷ On these charges see Kalen's commentary in *P. Berl. Leihg.* I pp. 55–8 and 110–17, with Wallace, *Taxation in Egypt from Augustus to Diocletian*, 42–3. Johnson and Börner disagree, arguing that both applied to the transport of wheat to the threshing floors, and that the difference merely lay in whether sheaves or ears of wheat were transported, Johnson, 'Roman Egypt', 404–5; Börner, *Die staatliche Korntransport*, 11–14. Payment was usually made in kind: for example *P. Berl. Leihg.* I 4,5; *BGU* II 429; III 832 and 921: *P. Tebt.* II 356. However, it could under certain circumstances be paid in cash, as in *P. Tebt.* II 356. It is unlikely, however, that the choice of payment method was made by the cultivator.

²⁸ So Kalen, *P. Berl. Leihg.* I. pp. 55–8.

²⁹ So Börner, *Die staatliche Korntransport*, esp. 11. Grenfell and Hunt's theory that the *δραγματηγία* was charged for the transport of grain from granaries to harbours, and specifically for the provision of camels by the state, should be disregarded. It rests tenuously on one document (*BGU* III 921, with *BL* I 84), and there seems no good reason to transport sheaves to harbours as all grain was cleaned and sifted at granaries.

There were a number of other charges made for transport at different stages. The *ἐπισπουδασιμῶν φόρετρον* was a charge paid by owners of private land for the transport of grain from the granaries to harbours. As mentioned above, such landowners seem not to have been responsible for the payment of charges for transport to the threshing floors or granaries, but were to organize this themselves. From land lease agreements, we know that it was usual for the owners of land to pay land tax, whilst their tenants were responsible for transport charges.³⁰ However, variations occur, and in a number of cases the lessor meets the cost of transport to the granary,³¹ but equally it is possible to regard this charge as one made to meet the expenses of an official whose task it was to supervise transport.³² The exact nature of the charges is ultimately unclear, and there were undoubtedly variations over time and place. The *διάφορον φόρετρον* was perhaps paid to cover the transport of wheat to granaries other than the one closest to the cultivator's land, but perhaps it is best to take it as a term used to describe any adjustment in the payment of *φόρετρον*.³³

Grain was collected at the threshing floors in the months of Pharmouthi and Pachon (April and May).³⁴ Threshing-floor accounts were kept with amounts of grain delivered by cultivators being carefully recorded.³⁵ This stage of collection was supervised by

³⁰ See for example *P. Tebt.* II 375 (AD 140), a contract for the lease of catoecic land. In ll. 24–5 there is a provision that grain should be delivered to the granary at the expense of the cultivator. On leases generally, see Rowlandson, *Landowners and Tenants*, *passim*, and on the contributions of landowners and tenants, see esp. 213–28. See also, ead. 'Agricultural tenancy and village society in Roman Egypt', in Bowman and Rogan, *Agriculture in Egypt*, 139–58.

³¹ *P. Tebt.* II 377 (AD 210) and *P. Coll. Youtie* I 27.

³² As Börner, *Die staatliche Korntransport*, 11–14.

³³ *P. Col.* V 1; Kalen, *P. Berl. Leihg.* I pp. 45–53; Börner, *Die staatliche Korntransport*, 11. See also R. Coles, 'Further papyri from the British Museum', *JEA* 56 (1970), 183–5 = *SB XI* 10889–90. Another charge, attested only once, was the *φόρετρον εὐθηναίαν*, see A. A. H. el Mosallamy, 'A private letter about transport charges', *Proceedings of the XVIIIth International Congress of Papyrology* (Athens, 1988), 113–18 = *SB XX* 14627.

³⁴ See Schnebel, *Die Landwirtschaft*, 171–2 on threshing floors.

³⁵ I know of no examples, but an unpublished wooden tablet from Hibis seems to preserve such an account: *Bod. Gr. Insc.* 3020. The text is badly abraded, but clearly begins with *λογός ἀλωνία*, followed by dates of different days in the month of Epeiph, with a list of loads delivered by donkeys, usually in threes and carrying the customary load of 3 artabas. Cited by courtesy of the Ashmolean Museum.

πράκτορες σιτικῶν, who received lists of cultivators responsible for paying tax, known as ἀπαιτήσιμα κατ' ἄνδρα.³⁶ We saw that for the Ptolemaic period it is not clear if cultivators were allowed to take any of their produce from the threshing floors until the state had exacted its tax payments. The issue rests on the fact that tax payments were often made in instalments. Johnson, we saw, doubted Rostovtzeff's theory that the state took payment in full at the threshing floors, and he had similar doubts about the Roman period. However, in a papyrus from Oxyrhynchos, dating to AD 292, we read that local officials 'having been enjoined by you [the *strategos*] to keep in safety the crops at the threshing floors in our lands until the *dekaprottoi* have received payment in full of the public taxes from each person'.³⁷ Similar documents suggest that the practice extended back into the late second century at least.³⁸ That we have two further attestations suggests that we are not here dealing with an emergency situation demanding special directions from the *strategos* about tax collection. However, we have to consider that procedures which existed in the Oxyrhynchite nome need not necessarily apply to the Arsinoite, and as the earliest evidence we have dates to the third century, we cannot be sure if such a practice existed earlier. On balance though, it seems reasonable to accept that the state exacted its tax payments at this point, before the process of transporting grain to the granaries and ports began.

The πράκτορες σιτικῶν assumed responsibility for the organization of transporting grain to granaries after its collection as tax in kind.³⁹

³⁶ See *P. Mich. Michael*. 3 intro. A good example of such a list is *P. Prag.* II 137 (AD 222) addressed to Aurelius Didymus, *strategos* of the Herakleides *meris* of the Arsinoite Nome, from a *praktor sitikon* and his colleagues. Tax collections were occasionally made in cash, and this was collected by πράκτορες ἀργυρικῶν; see Wallace, *Taxation*, 37; D. H. Samuel, 'Taxation at Socnopaiou Nesos in the early 3rd century', *BASP* 14 (1977), 161–207; *CPR* XV 35–8 with p. 88 n.1, for a list of relevant texts. Some lists appear to be working copies, while others were submitted to the office of the *strategos*.

³⁷ *P. Oxy.* X 1255 (AD 292).

³⁸ *P. Oxy.* XLII 3028 (early third century). The earliest example is *P. Petaus* 53 (AD 184/5).

³⁹ See *P. Oxy.* XVII 2121 (AD 209 or 210), for a liturgical official, whose official title is lost, appointed to 'promote peaceful government and to see to the safety of the deliveries to the public granaries'. It is possible that this official was an *eirenarch*, an official normally in charge of public order, but who could, when necessary, be

There could be no delay in transporting grain to granaries—it could not be left to deteriorate on the threshing floors. So, in the months Pachon to Epeiph (May to July), tax-grain was transported to granaries, where it was received by their chief officials the *sitologoi*. The role of these officials involved both the collection of grain at granaries and either its distribution as seed loans to farmers or its storage before transport to Nile harbours. They were appointed from within the communities in which they served, but often had a competence extending beyond their village of residence.⁴⁰ Usually appointed singly in the early Roman period, *sitologoi* gradually come to work in colleges, and at sometime, probably in the first century AD, the post became liturgical.⁴¹ They seem only to have been responsible for tax paid in kind, and this distinguishes them from officials known as *dekaprotoi*, who replaced *sitologoi* for a time in the second half of the third century, possibly as part of a series of reforms initiated by Philip the Arab.⁴² *Dekaprotoi* appear to have been responsible for the collection of land taxes both in kind and in cash.

Sitologoi received all taxes paid in grain as well as rents for public land. They issued receipts for grain so received and submitted

concerned with matters of grain supply. We should however, be careful not to draw too rigid a distinction between matters of public order and those concerning economic issues, as often the two could overlap. In the only certain reference to an *eirenarch* in connection with the grain supply, *P. Oxy.* XXXI 2568 (AD 264), an individual confirms that he had received back his boat, which had been used as a lighter for loading grain. This text does not in any way show that the *eirenarch* was involved in matters of grain transport per se, but may have simply supervised the return of private property used for state service.

⁴⁰ The titles of *sitologoi* often reflect their region of responsibility—which could include groups of villages. Presumably this would allow for more continuity of administration. See Z. Aly, ‘Sitologia in Roman Egypt’, *JJP* 4 (1950), 289–307 and id., ‘Upon sitologia in Roman Egypt and the role of sitologoi in its financial administration’, *Akten des VIII Internationalen Kongresses für Papyrologie* (Vienna, 1956), 17–27. See also the commentaries to *P. Mich. Michael* 3 and *P. Vindob. Worp* 4.

⁴¹ Lewis, *Compulsory Public Services*, 45.

⁴² Sometime between AD 242 and 247, *dekaprotoi* appear, but *sitologoi* reappear in AD 302. See E. G. Turner, ‘Egypt and the Roman empire: the Δεκάπρωτοι’, *JEA* 22 (1936), 7–19, and J. D. Thomas, ‘The introduction of dekaprotoi and comarchs in Egypt in the third century AD’, *ZPE* 19 (1975), 111–19. On the reforms of Philip, see P. J. Parsons, ‘Philippus Arabs and Egypt’, *JRS* 57 (1967), 131–41, with Adams, ‘Transition and change’, 101–2.

a monthly report to the *strategos* of their nome.⁴³ These reports varied in character—they could be daily reports, five or six day reports, monthly, bi-monthly, or submitted every 4 or even 10 months or annual reports⁴⁴—and were made up from the day-books kept by *sitologi*, which were in turn drawn up from receipts and memoranda (often on ostraca). The careful recording of details demonstrates the interest that the Roman government had in the everyday operation of the collection and transport of tax-grain.

Granaries (or *thesauroi*) performed a vital function within the agricultural economy and enjoyed a two-level relationship with the villages and land on which they were found. They were used for the storage of state grain, which would either be distributed as seed loans or transported by river to supply the main cities of Egypt—Memphis and Alexandria—or to supply the city of Rome itself. However, granaries were also used to store privately owned grain. No doubt the reason for this was the security that state granaries offered in terms of accurate record-keeping and protection of the grain stored by guards. There is also the added advantage of state granaries in the easy transfer of grain in deposit between granaries by a system of credit.⁴⁵ But the safe storage of state grain until its transport to harbours was of paramount importance.

TRANSPORT TO GRANARIES AND PORTS

Sitologi were responsible for the onward transport of grain from the granaries to harbours on navigable canals and on the Nile. This

⁴³ For this process, see Wallace, *Taxation*, 35, who suggests that the fact that payments are noted as coming from particular categories of land, implies they were taxed at a different rate. The most important examples of such receipts are preserved as *P. Berl. Leihg.* I 2, where a distinction is made between cleruchic and cateoic land.

⁴⁴ See *BGU XIII 2299* (AD 162) with parallel documents cited in the commentary. This document is unusual in that it is a receipt issued by *sitologi* recording tax paid in two consecutive years, and is therefore a good illustration of the diversity of documentary practice in granaries. The classic work on granaries is, A. Calderini, *ΘΗΣΑΥΡΟΙ: ricerche di topografia di storia della pubblica amministrazione nell'Egitto Greco-romano* (Milan, 1924); a more recent discussion is provided by M. Sharp, *The Food Supply of Roman Egypt*, DPhil. thesis (Oxford, 1998), 237–59.

⁴⁵ Sharp, *Food Supply*, 253–9.

stage of transport, as in the Ptolemaic period, was known as the *καταγωγή*.⁴⁶ The scale and complexity of this stage of the transport system depended very much on one's location within Egypt and the local topography. If granaries lay close to navigable canals, grain could be loaded directly onto barges. There are only two papyri mentioning the transport of grain to a Nile port by boat or barge (*P. Oxy.* IX 1197 (AD 211); XXX 2568 (AD 264)). Both date to the third century and come from the Oxyrhynchite nome. If not close to a navigable stream, then transport overland was necessary. For the Fayum, of course, which lay far from the Nile, transport by land was particularly important. As we shall see, the arrangements for transport from village granaries to ports was complex and displays a significant level of central management from *strategoï* both within their nome and in drawing on resources from other nomes.

Animals and drivers

A central issue governing the provision of animals for state service is where and from whom did the state demand transport service or the provision of animals. This is a difficult and controversial question and has far-reaching ramifications, especially with respect to whether transport 'guilds' existed within Egypt. It is also bound up with the relationship and interaction between the state and individual, the development of liturgical transport services and animal requisition: in short, many of the central themes of this book.

We have established the bureaucratic systems that enabled the state to identify sources of animals it could direct to its transport demands. These were the basic devices of interaction between state and individual. The best attested, and arguably the most important, state service was the transport of grain from granaries throughout Egypt to river ports on the Nile, from whence transport by boat to Alexandria could begin. Other requirements were the supply of the army, or the quarries and mines of the Eastern Desert, the support of state operation in the region more generally, and, as we have seen, the requirements of state officials travelling in Egypt.

⁴⁶ On this term see *P. Col.* II 1 recto 5, p. 156.

Here we need to consider the supply of animals for grain transport. This was eventually to become a liturgy, probably sometime in the second century, if not before, but it is likely that small changes over time were made to a system which existed at least from the time of Augustus. We need also to account for the probability of significant regional and local variation in practice, and, of course, the uneven preservation of our evidence in time and place.

Animals owned by individuals living in villages in the *chora* could be pressed into state service, based on information collected through the bureaucratic systems discussed above. The first definite attestation of the liturgy, known as the *τριονία ὄνηλασία*, is from AD 166.⁴⁷ It seems to have existed until at least AD 318. The required property qualification was 1200 drachmas, later rising to 2000.⁴⁸ The development of this liturgy represents a further step in the process of devolving the organization of state-driven requirements onto the provincial population.

Each liturgist was obliged to supply three donkeys for state service for a period of one year, although there is evidence to suggest that responsibility for supplying animals (annually) could be split between a number of different individuals, which would serve to decrease the burden on each.⁴⁹ The area of responsibility for each liturgist was the village in which he resided, although as we shall see below, animals so supplied were often used in other villages and divisions of the Arsinoite nome as transport duties demanded.

Donkeys used for the transport of grain were known as *δημόσιοι ὄνοι*, while their owners and drivers were styled *δημόσιοι κτηνηνοτρόφοι*, or *δημόσιοι οἴηλάται*. The question as to exactly what the status of these donkeys was has been the matter of some debate, but a papyrus from the Herakleopolite nome confirms beyond doubt that *δημόσιοι ὄνοι* were the property of individuals who were obliged

⁴⁷ *P. Oxy.* XVIII 2182 (AD 166); although *BGU I* 136 = *M. Chr.* 86 (AD 135) may refer to this liturgy.

⁴⁸ See Lewis, *Compulsory Public Services*, 38. The evidence is *P. Oxy.* XVII 2131 = *Sel. Pap.* II 290 (AD 207) and *P. Flor.* I 2 (AD 265).

⁴⁹ *P. Flor.* I 2 viii, two people; *P. Oxy.* XL 2915, three people; and *P. Oxy.* XL 2940, four people. The texts from Oxyrhynchos refer to a liturgy in the metropolis, which is discussed below.

to use them for state service.⁵⁰ The principal document concerning this liturgy is worth quoting in full:

Aemilius Saturnilus to the *strategoï* of the Seven Nomes and the Arsinoite except the Oasis, greetings. I notice that the corn-lading is severely neglected by you. For each of you ordered by us to have wheat in the granaries ignores our command, only having the excuse that there is a scarcity of those whose duty it is to transport it. In my opinion, then, I have often given orders to bring them to the usual number, but you have ignored my letters, but you have made other excuses, cooperating with the donkey-drivers in wrongdoing. You bring them up to the usual number, but you do not compel them to support⁵¹ the usual number of three donkeys. Hence they receive the regular fee for transport, but the *fiscus* suffers. That this state of affairs does not continue, if there is hereafter a number who do not have the accepted quota, and those who do, I order that you compel each of the donkey-drivers to support three donkeys and that you brand each donkey. Thus the drivers will be compelled to maintain three donkeys and you can detect the drivers in their thefts. I bid you farewell.⁵²

If the state provided donkeys for the drivers to maintain, this scenario could not have happened, as they would have been given three animals, and would not be held accountable if they did not provide the requisite number. It seems that it was common for fewer than three animals to be provided; there are a number of papyri that suggest this.⁵³ The ‘usual number’ of three was an ideal, rarely achieved. We must conclude that public donkeys were the property of liturgists who were obliged to provide them for state service.⁵⁴ It is

⁵⁰ See *PSI* XII 1229 (AD 217), in which public donkey-drivers undertake to provide the animals they own for the transport of state corn: *ἕκαστον ἡμῶν τὰ ἐπιβάλλοντα αὐτῷ κτήνη πρὸς ἐμβολὴν δημοσίου πυροῦ*. The verb can mean ‘assigned to’, but its more usual meaning is ‘to belong to’ (see, e.g. *BGU* XV 2460). We should note that in no instance does an individual provide both public and private donkeys.

⁵¹ The verb used is *τρέφω* and its meaning is ambiguous in this instance. Of animals it is usually held to mean ‘to rear or keep’, but it can have the meaning ‘to maintain’ or ‘provide food for’.

⁵² *BGUI* 15 col. ii (AD 197) (trans. adapted from Johnson) with corrections at *BLI* 8.

⁵³ *BGU* XIII 2364 (second century) is a list of donkey-drivers on which 18 entries are preserved, only three of which provide three donkeys. See also *P. Hamb.* I 33 (late second century) and *P. Harr.* I 93 (AD 294). *P. Lond.* II 443 (p. 76) lists foals as well as adult animals.

⁵⁴ As argued by Börner, *Der staatliche Korntransport*, 20: ‘Vermutlich hatte demnach der *δημόσιος κτηνοτρόφος* mit seinen Tieren ausschließlich im staatlichen Transportdienst zu arbeiten’.

difficult to accept that any other explanation is in the spirit of the Roman system, which was, as we shall repeatedly see, to transfer as much of the burden of any service onto the local population and the individual. We know from a document from Oxyrhynchos, a petition concerning illegal nomination to the liturgy, that it was considered an onerous task.⁵⁵

If the burden of transport was too great for public donkeys alone, the state could require other animal-owners to provide their donkeys, called *ιδιωτικοὶ ὄνοι*, for service. These animals often appear alongside public donkeys in transport operations, but were never driven by public donkey-drivers, and no individual is ever recorded providing both public and private donkeys.⁵⁶ It is often difficult, given the fragmentary nature of much of our evidence, to acquire a coherent picture of just how such transport was organized, but a number of detailed documents have been preserved which record the transport of grain and the arrangements made to pay the animal-drivers over a period of some days.⁵⁷ In the Arsinoite nome, there seem to be roughly equal numbers of public and private donkeys involved in transport in the village of Theadelphia in the Themistos division, but the interesting point is that all the public donkeys used come from the Polemon division. The private donkeys all come from either Theadelphia or other villages in the Themistos division. Thus it seems that public donkeys had to be available for use at any location, and were part of a set transport corps, while local animals could be used to carry any surplus grain and generally assist in the process of transport. If this is the case, it is consistent with the high degree of central organization so clear from our evidence.

A third category of animal was available for the transport of grain: *ναυλώσιμοι ὄνοι* appear to have been donkeys which were hired from their owners. The exact nature of the arrangement is unclear, as there is only one reference in the published papyri.⁵⁸ It is possible that they

⁵⁵ *P. Oxy.* XVII 2131 (AD 207). This liturgy may be for the metropolitan donkey-drivers discussed below.

⁵⁶ See *P. Berl. Frisk.* 1 = *SB V* 7515 (AD 155); *P. Col.* II 1 rectos 4 and 5 (AD 155), now considered to be part of the same document as *P. Berl. Frisk.* 1, see *BGU XIII* 2269 intro.; *BGU XIII* 2270–2 (second century).

⁵⁷ *P. Col.* II 1 rectos 4 and 5.

⁵⁸ *BGU XIII* 2272 (second century).

were used to supplement the number of animals used for grain transport at a local level, although it is unclear why the state found it necessary to hire donkeys if it could requisition them. Perhaps the circumstances leading to the hire were unusual, either problems linked to the Nile flood or administrative problems such as public donkey-drivers absconding. Whatever the case, on the strength of this evidence, we should be wary of thinking that the hiring of donkeys in this manner was a regular feature of the system of grain transport.

Finally, in the *metropoleis*, or at least Oxyrhynchos and Hermopolis, the sources of our evidence, donkeys and drivers seem to have been assigned to transport duties specific to cities. There is a small amount of evidence for *δημόσιοι ὀνηλάται μητροπόλεως*, who were certainly liturgists, but how they fitted in to the system of state transport is unclear.⁵⁹ It seems likely that their task was to transport grain for the city's food supply, and in Oxyrhynchos at least, there may be a connection between this liturgy and the city corn dole, for those *onelatai* who performed the liturgy seem to have become eligible to receive the dole.

Our evidence shows that, when required, animals could be brought from neighbouring nomes, and sometimes much further, to transport grain—the purpose of this movement of animals was to concentrate effort in the transport of grain in one particular region, which implies a system of transport to which officials must adhere.⁶⁰ In the documents mentioned above, we saw that animals from the Polemon division of the Arsinoite nome were used to transport grain in the village of Theadelphia in the Themistos division. Another papyrus from Theadelphia records payments made to animal-owners in the village of Sobthis in the Herakleopolite nome for transport carried out in the Themistos division of the Arsinoite nome. In another text from the second century, a woman camel-owner from Soknopaiou Nesos claimed payment for grain transport performed in the previous

⁵⁹ Oxyrhynchos: *P. Oxy.* XL 2904; 2906; 2909; 2915; 2917; 2940 (all third century). Hermopolis: *CPR XXII* 4 (AD 163–9). See also *P. Bad.* IV 89 (AD 222–35), and possibly *P. Oxy.* XVII 2131 (AD 207).

⁶⁰ A similar system of grain transport existed in the Oxyrhynchite nome, discussed further below.

year, again in the Themistos division of the nome.⁶¹ In a further document, animals from the Kynopolite nome were used to transport grain from the Arsinoite villages of Lagis and Trikomia.⁶² In the Oxyrhynchite nome, the same occurs, made clear from an account of payments to donkey-drivers for transport between different toparchies of the nome.⁶³ Provision for the return of animals to their places of origin seem to have been made suggesting that the state kept a careful record of who provided animals so that animals could be returned to their rightful owners. We know from an important late-third-century papyrus that wagons requisitioned by the state had to be returned to their owners, and from a fourth-century text we have details of the return of animals to the village of Magdola Mire in the Hermopolite nome after their transport duties had been fulfilled.⁶⁴ We should be mindful here that documentation is simultaneously oppressive and protective in nature. Through the keeping of records, the state could requisition animals; keeping copies of documents allowed the owners of animals or wagons to prove their ownership.

There is no doubt, given the size of the Arsinoite nome and its distance from the Nile, that transporting grain was a larger and more complicated undertaking here than anywhere else in Egypt excepting the Oases.⁶⁵ It was thus with some worry that Heliodorus, the *strategos* of the Themistos and Polemon divisions of the Arsinoite, wrote to the royal scribe of the Oxyrhynchite nome concerning the provision of animals for grain transport:

If you were present when the most illustrious prefect threatened the *strategoï* with regard to the transport of the corn, to send as many animals as possible from the other nomes to work in the Arsinoite, they had proceeded against the herdsmen who had presumptuously run away after the order of the prefect... Although there were only 411 donkeys here from your nome, most of them have run away, so that up to the present only 156 are remaining, with whom the notables who had been appointed over them

⁶¹ Sobthis: *P. Berl. Leihg.* I 2 recto; *P. Aberd.* 30 (AD 139).

⁶² *P. Hamb.* I 17 (AD 210).

⁶³ *P. Oxy.* XIV 1748 (third century).

⁶⁴ *P. Panop. Beatty* 2 ll. 153–4 (AD 300) and *P. Lips.* 85–6 (AD 372–3).

⁶⁵ This may find some reflection in the weight of documentation pertaining to grain transport among the Fayum papyri.

had in the public spirit to remain . . . send an equal number of donkeys with herdsmen of standing, who can stay, in order that while the river is still navigable, the transportation may be carried out, because the water is already imperceptibly rising [or falling] and the need is urgent that the corn be very quickly brought down.⁶⁶

Thus it was, as Youtie puts it, that ‘public donkeys and their drivers were moved around the country, from one nome into another, and especially into the Fayum, so that their number could be adjusted to “seasonal and sectional needs”’.⁶⁷

A more precise indication of what proportion of animals used for grain transport within the Fayum came from other nomes can be established using the valuable evidence of transport memoranda of the third century. Over 430 ostraca from the Fayum record the delivery of grain to Nile harbours from the granaries of various Fayum towns. Often classed as receipts, they rather have the appearance of memoranda written by the *sitologoi* of the granaries concerned that served as notes from which their day-books and accounts would be drawn up.⁶⁸ They served to provide the *sitologoi* with a method of monitoring the transport of grain to harbours and to note the villages that supplied animals for transport, which served as the basis of payment. Of these documents, 146 preserve the name of the village from which the transport animals originated, and this enables us to assess the extent to which animals were moved around the Fayum.⁶⁹

The results are significant. For the Fayum as a whole, 38 per cent of animals transporting grain come from other nomes, especially the Herakleopolite and Oxyrhynchite nomes.⁷⁰ Two Fayum villages,

⁶⁶ *P. Oxy.* XVIII 2182 (AD 165?) (trans. Wegener). See Youtie, ‘Oxyrhynchus Papyrus 2182’.

⁶⁷ H. C. Youtie, ‘Greek ostraca from Egypt’, *TAPA* 81 (1950), 100 = *Scriptiunculae* i 214.

⁶⁸ For a full list of texts, see *P. Köln* IX 380 intro., with Reiter, ‘Vorschläge zu Lesung und Deutung einiger Transportbescheinigungen’, for an excellent discussion. To this list should be added N. Gonis, ‘Five ostraca from Oxford’, *ZPE* 144 (2003), no. 5, 185–6.

⁶⁹ The village names are not without their problems of interpretation, but see *P. Köln* IX 380 for a list by village.

⁷⁰ The fact that the Oxyrhynchite nome is strongly represented suggests that the letter of Heliodorus mentioned above may not simply be a response to a specific crisis, but rather dealing with a more regular problem.

Karanis and Theadelphia, have provided enough ostraca for an estimate of animal use to be made for them. At Karanis, situated in the north-west of the Fayum in the division of Herakleides, 19 per cent of animals come from other nomes, while a much higher proportion are to be found at Theadelphia, some 55 per cent. This should be explained in terms of geographic location: Karanis lies to the north of the Fayum, and is therefore further away from the nomes to the south which provided most of the animals. This point is strengthened by the fact that, of the animals from other nomes attested at Karanis, most come from the Memphite, the closest to Karanis. Most of the animals used in the Fayum, then, come from the three divisions which made up the nome, but there was a significant movement of animals, not only from one division to another, but from other nomes close to the Fayum.

There is no evidence of animals from the Fayum being taken to other nomes to transport grain, and, given the survival pattern of our evidence, there is little that convincingly illustrates the organization of transport in other nomes. In one text we have already considered, however, animals in the Oxyrhynchite were used in a number different toparchies of the nome to transport grain. One papyrus which we shall consider in detail below, shows that, at least in the Oxyrhynchite nome, there existed a strict system of granary clearance which was designed to optimize the available transport resources, which in this case was not working or had been ignored by the relevant official.⁷¹ Once the transport requirements of the Oxyrhynchite nome were met, those donkeys and their drivers on public service would then be sent to the Fayum to assist in the transport of grain there. Thus, there were always too few animals to carry out grain transport in any nome, and especially the Fayum, but through the adoption of a system of granary clearance and a careful distribution of transport resources throughout the nomes, the state was able to ensure the transport of all grain it required.

It is clear that donkeys were the animals most commonly used for the transport of state grain, but there is evidence for the use of camels. These larger and more expensive animals, we have seen, were commonly found on the desert fringes of the Fayum, in villages

⁷¹ *P. Oxy.* XXII 2341 (AD 208).

such as Soknopaiou Nesos, Karanis, and Dionysias. It is certain that they carried grain from these villages to the granaries at the Nile ports, but the state could make further demands if necessary. Camels and their owners (*καμηλοτρόφοι*) seem to have been organized in the same way as other *κτηνοτρόφοι*, according to the systems discussed below, but were certainly not used to the same extent as donkeys. Although camels could carry more, they were more suited physiologically for desert travel, rather than the heavily irrigated and more agricultural topography of the Fayum.

Organization of animals

Once the state had assigned the liturgy of providing donkeys for state use, the grouping of animals and their allocation to transport duties had to be arranged. There is little evidence for this vital part of transport organization, but what we have is informative and can lead to a number of tentative conclusions.

It was the duty of village scribes to put forward the names of those individuals in the village who were eligible for liturgical service or for the provision of animals for state transport. As we have seen, this process was based on a careful census and registration process, and on information kept in village registry offices. Thus, in AD 185, the village scribe of Kerkesoucha Orous and a number of associated villages, a man named Petaus, was able to nominate a camel-owner for state service:

To Apollonios *strategos* of the Herakleides division of the Arsinoite nome, from Petaus *komogrammateus* of Kerkesoucha Orous and the other villages. As you ordered, below is the name of the person nominated to provide a male camel from this and the other villages, having sufficient property and being suitable. The name is as follows: Pnepheros son of Onnophris and Taorsiepis. 25th year of Marcus Aurelius Commodus Antoninus Caesar the lord, Epeiph 12.⁷²

This text shows that, at least in this village, only one camel had to be provided for state service. Numbers requisitioned may have varied with village size. It seems possible that these animals

⁷² P. Petaus 85 (AD 185).

would be available for service throughout the nome and beyond; in the case of camels, as we shall see, this could include service in the quarries and transport routes of the Eastern Desert. This presupposes that the animals would be gathered at certain locations within the nome with their drivers, where transport tasks would be allocated. This procedure would certainly be necessary before animals such as the 411 donkeys from the Oxyrhynchite working in the Fayum could be taken to their destination. We have a small amount of evidence suggesting how this may have been organized.

The Greek word normally used in the papyri to describe either the collection of certain taxes or the gathering of certain types of goods or products is *παράλημψις*, which has the usual meaning of 'receiving from another', and those individuals whose task it was to gather were known as *παράλημπτης*. In only one document from the Oxyrhynchite nome, dating to around AD 130, is there mentioned a liturgy, which must be connected with the supervision of transport animals for state use.⁷³ This was known as the *παράλημψις ιδιωτικῶν ὄνων*. Two men from the village of Septhta in the Lower Toparchy of the nome were appointed by the *komogrammateus* in order to establish what must have been a form of 'reception centre' for animals. The name of the liturgy suggests that it was specifically related to the gathering of private donkeys, which may have been required in addition to the public donkeys. If this was organized at a village level, then this must have been some area where animals could be gathered and assigned loads. But it is possible that it extended further, and indeed this would have been necessary for the collection of animals to be taken to other nomes.

In the Oxyrhynchite text we considered above, relating to the absconding of donkeys from transport duties in the Arsinoite nome, a number of other details can be brought to light, and this allows a link to be made with other forms of requisition discussed in the previous chapter. We saw that most of the animals had run away, and that 'only 156 are remaining, with whom the notables [*εὐεχήμεωνες*] who had been appointed over them had in the public spirit to remain'. The strategos was required to 'send an equal

⁷³ SB XIV 12168 (AD 130?); H. C. Youtie, 'P. Mich. inv. 974: ΠΑΡΑΛΗΜΨΙΣ ΔΙΩΤΙΚΩΝ ΟΝΩΝ', ZPE 28 (1978), 245–8 = *Scriptiunculae Posteriores* i 433–6.

number of donkeys with herdsman of standing'. It seems that the role of *euschemones* extended from the conveyance of requisitioned animals to all state transport, including the *annona*. There is some other information preserved; in two papyri, our text noted above, and in one dating to the third century, a *euschemon* acts as a *paralempetes*, which suggests that the two could sometimes be linked.⁷⁴ It seems here that their responsibility extended to public donkeys, and sometimes they were assigned to the supervision of requisitioned camels, as we have seen.⁷⁵ It has also been shown that it was likely that *euschemones* had to accompany the animals—this is certainly the case in our text above—and the same was true with journeys by river, when it was incumbent upon them to remain with cargoes.⁷⁶

This was a crucial part of the system. All our evidence comes from the second century, so the most that we can say at this stage of our knowledge is that, at some point it became customary to appoint liturgists, who probably came from the metropolitan class, to supervise the receiving and escort of transport animals, and that this system was established by at least the second half of the second century. The procedure may have been that *paralempantai* were responsible for gathering animals in paddocks or collection points, from where they would be escorted by *euschemones* to their destination.⁷⁷

Villages and 'guilds'

While there seem to have been provisions for the gathering of transport animals, it is clear that they were organized according to their village of provenance. This is certainly the case in the third century, from which our evidence (in the form of memoranda preserved on ostraca from that time) shows that the village of origin of animals was carefully recorded. This is important, for it is at village level that we find the core of the system. As we have seen, village scribes were responsible for the allocation of

⁷⁴ BGU II 381 (second or third century).

⁷⁵ *P. Stras.* IV 245 (AD 216); *P. Bas.* 2 (AD 190).

⁷⁶ *P. Oxy.* LX 4063 (AD 183). On this in general, see Lewis, 'Εὐσχημονεὺς'.

⁷⁷ For animals requisitioned for use in the Eastern Desert, see Adams, 'Who bore the burden?', 180–3.

transport liturgies, and for determining who supplied animals, in response to directives from senior officials. Animals and their owners from each village, or sometimes a number of villages, worked as a group, seem to have communicated to the central authorities of the nome as a group, and were paid for their services as a group. Our evidence for groups of transporters is confined to the second and third centuries, and it is tempting to link the development of this collective responsibility of villages to provide and organize transport to the substantial reforms made by Trajan to a large number of facets of administration and taxation in Egypt.⁷⁸

Whatever the origins, by the mid-second century transporters were working collectively, and by the third century the practice was embedded. Village scribes drew up lists of animal-owners and the number of animals they possessed, and some of these may have been preserved.⁷⁹ There is some evidence for these lists being made available to *strategoï* by individuals styled *κτηνοτρόφοι* or *καμηλοτρόφοι*, or very occasionally *ἀρχονηλάται*. The exact status and function of these individuals is not clear from our evidence, neither is their relationship to village scribes whose function was to provide lists of liturgists for the central authorities.

There is a good deal of evidence for animal-owners acting together to claim payment from the state.⁸⁰ The scholarly consensus has been that in doing so, they are to be understood as guilds of transporters.⁸¹ They are certainly represented as a group by individuals in cases of dispute,⁸² and secretaries and other intermediaries act for them in

⁷⁸ See Sijpesteijn, 'Trajan and Egypt', id., 'Tax reforms under Trajan', *ZPE* 42 (1981), 115–16, and more recently, Sharp, 'Shearing sheep', 227–8.

⁷⁹ Lists of names are common in the papyri, but there is clear evidence for lists of *onelatai* and animals, the best examples being *P. Col.* II 1 recto 5 (AD 136–50), *P. Hamb.* I 33 (late second century) and *BGU XIII* 2364 (second century); closely related is *P. Lond.* II 443 (p. 78) (second century). See also *P. Berl. Leihg.* II 41 and II 39 v (AD 150–200). *P. Mich.* IX 543 (AD 134–6) preserves a list of camels and camel foals in the village of Karanis, compiled by a *καμηλοτρόφος*.

⁸⁰ Principally *P. Col.* II 1 recto 4 (AD 155), see also *P. Berl. Frisk.* 1 = *SB V* 7515, *BGU XIII* 2269 and IV 1170, and *P. Lond.* II 295 (p. 100).

⁸¹ See Rostovtzeff, 'Kornerhebung', 219–20; Wilcken, *Grundzüge*, 378; San Nicolò, *Ägyptisches Vereinswesen*, 113; Oertel, *Die Liturgie*, 117; and Börner, *Die staatliche Korntransport*, 19.

⁸² See *P. Oxford* 4 (AD 150–1), where camel owners as a group are represented by an advocate in the course of a legal dispute heard by the prefect Lucius Munatius Felix.

payment requests.⁸³ Despite the fact that in our evidence there is no mention of the usual guild officials, such as presidents, these intermediaries have been taken as such.⁸⁴ There are several factors militating against this traditional view. First, there are a number of examples of individual animal-owners making claims for payment, so therefore they must have acted independently.⁸⁵ Second, if these were guilds in a rigid sense, we would expect them to be both exclusive in their membership and permanent in nature, but our evidence suggests that this is not the case. There is one example of a private animal-owner (*ἰδιωτικὸς κτηνοτρόφος*) applying for payment alongside public donkey-drivers, who we might imagine were 'guild' members.⁸⁶ In a number of cases, animal-owners from several different villages make requests for payment, which suggests a loose structure.⁸⁷ Any permanent nature surely runs contrary to the workings of the liturgical system. The supply of donkeys for grain transport was a liturgy and therefore had a specific duration; in this case a period of one year.

There is no question that animal-drivers acted in groups. At least in part this must have been due to the collective responsibility of villages to provide transport, but perhaps a more fundamental reason was the pattern of literacy.⁸⁸ Where animal-owners have submitted requests for payment themselves, no intermediaries are mentioned. Otherwise, and in most cases, because animal-drivers were mostly illiterate, *nomographeis*, notaries, act on their behalf; drivers probably found it more convenient and cheaper to club together, perhaps even on the advice of notaries, keen to balance their workloads. We should therefore abandon the notion of guilds. Lists of transporters were kept

⁸³ For *grammateis*, see *O. Fay.* 14–15, both dating to AD 1, at which early date the organization of transport was considerably different to that of the second century.

⁸⁴ On guilds, see San Nicolò, *Ägyptisches Vereinswesen*; A. E. R. Boak, 'The organisation of gilds in Graeco-Roman Egypt', *TAPA* 63 (1937), 212–20.

⁸⁵ *P. Col.* II 1 recto 4 (cols iii; xiii; xv); *P. Aberd.* 30 (AD 139) (*BL* III 211), a petition from a female camel-owner from Soknopaiou Nesos for payment for grain transport in the Themistos *meris*.

⁸⁶ *P. Col.* II 1 recto 4 col. iv.

⁸⁷ *P. Col.* II 1 recto 4 cols i, iv, vi and xviii.

⁸⁸ See the interesting observations of K. Hopkins, 'Conquest by book', in M. Beard *et al.*, *Literacy in the Roman World* (Ann Arbor, 1991), 133–59, esp. 155, where his definition of 'guild' seems too rigid in the case of state transporters.

for ease of administration, and cooperative requests for payment were made by transporters in the interest of expediency.

Procedure

We are fortunate in that we have a number of substantial documents that cast light on the organization of the transport of grain from granary to harbour. The first text we should consider is *BGU XIII 2272*, which dates from the second century AD. This is an account of grain transported by pack animals from granaries in the *sitologia* of the village of Berenikis Thesmophorou in the Arsinoite nome.⁸⁹ The destination is likely to have been a nearby port, perhaps Kaine.⁹⁰ Small ports on navigable canals may have been used to load barges and lighters (mentioned above) which transported grain to the main harbour of Ptolemis Hormou for loading onto larger river-going ships. The availability of river transport may have encouraged this process (and would certainly ease pressure on already overstretched animals and drivers), and evidence for it may be seen in a text dating to AD 155, which is a receipt for payment of grain transport fees to state animal-drivers from the village of Narmouthis. In this, the animal-drivers state that they have received payment for their transport of grain to *the harbours* in plural, which suggests reference to the smaller and more numerous canal harbours.⁹¹

⁸⁹ The editor suggests that the granary at Berenikis Thesmophorou may have been a 'central' granary receiving grain from smaller granaries in the outlying villages for onward transport to the port. We have noted already that a series of local granaries was a more efficient way of collecting grain, and there is no reason to suspect that there be another stage in the process. There is no direct evidence for it, and internal evidence from this text shows that subdivisions were based on the status and village of origin of the pack animals rather than of grain. This means that we should disregard the notion of central granaries which finds its way into the scholarly literature: Wallace, *Taxation*, 35; Börner, *Der staatliche Korntransport*, 8 n. 29; and Calderini, *ΘΕΣΑΥΡΟΙ*, 103–4.

⁹⁰ See *BGU XIII 2272* introduction for discussion; with Börner, *Der staatliche Korntransport*, 8 and *P. Petaus* p. 23.

⁹¹ *BGU XIII 2270* (AD 155) ll. 8–9—[εἰς τοὺς] ὄρμους. This text is part of a larger series of so-called *pittakion*-receipts preserved as *P. Berl. Frisk 1* = *SB V 7515* and *P. Col. 1 recto 4*, now considered to be part of the same *tomos* or roll, see *P. Col. V* pp. 142–4.

The account preserves details of a transport operation that took place over a period of seven weeks (13th June–31st July of an unknown year). A total of 1734 donkey-loads of wheat were transported, making a total of 5202 artabas—as each donkey carries exactly 3 artabas.⁹² The category of the donkeys involved—either public, private, or hired—as well as their village of origin, form the units into which the text is divided. We have seen that it was common for animals from other villages and even other nomes to perform transport, and it was necessary, for the sake of efficiency, for the state to know exactly where each group of animals was assigned. Donkeys from five different villages of the Polemon *meris* of the Arsinoite Nome were involved in the transport of this wheat. Public donkeys from Narmouthis, Ibion Argaiou, and Magdola, and a village whose name is lost, carried 1354 of the loads. Hired donkeys from the village of Berenikis itself carried 370, and the remaining 10 were carried possibly by privately owned donkeys. Presumably work carried on at full pace until the granary was cleared of all tax-grain required by the state.⁹³ Indeed there is good reason to think that there was a pre-determined pattern of granary clearance, and that transport of all grain at granaries in regions was completed in cycle, a point to which we will return with respect to the Oxyrhynchite nome.

A similar account is preserved in *P. Hamb.* 17, although dating slightly later, perhaps to AD 210. This document has been the subject of much debate, as the editor believed it to be a report submitted to harbour guards (who had some responsibility for receiving loads of grain) by a *naukleros*, or ship's captain. As such though, it would be the only evidence for a *naukleros* being involved in the transport of grain by land—and it is hard to imagine that they would have authority in such matters when other officials are clearly involved. It is doubtful, for example, that *naukleroï* would have had any role in

⁹² The records are interesting not only in their accuracy but that they give clear support to the suggestion that the normal load for a donkey carrying state grain was 3 artabas.

⁹³ This may be the case, for example, with the transport operation detailed in *P. Col.* I recto 5 (AD 136–50), in which donkeys from 19 different villages clear the granaries of a village whose name is lost over a period of 2 days. The flavour is certainly one of a determined effort to clear grain stocks as quickly as possible.

the distribution of transport animals called from their village of origin. The system seems to have been very much more centralized than this. Additionally, the document is very similar in character to reports submitted by *sitologoi*, and indeed the verso of the text preserves such reports. It also seems fairly clear from the text that the *naukleros* was responsible for the transport of grain by canal, after its delivery by animals.⁹⁴

The report begins as follows:

Account of carrying down of grain of the harvest of the 18th year from the villages of Lagis and Trikomia to the harbour guards of the Sacred Grove through animals of the Kynopolite nome, transported [by canal?] on the 24th Epeiph through the agency of the *naukleros* Ammonios.

There follows an account of the transport of 1730 artabas of wheat over a 6-day period (21–26 October) from the villages of Lagis and Trikomia in the Arsinoite nome to the harbour of the Sacred Grove at Ptolemais Euergetis, the metropolis of the nome. The grain was carried by donkeys from villages in the Kynopolite nome, which lies to the south-east of the Arsinoite, and this is solid evidence for the use of animals from other nomes in the Fayum, mentioned above. Details of transport for the first 2 days only remain, and on these 294 and 282 artabas were transported. On the basis that these donkeys carried the normal load of 3 artabas, it is likely that between 94 and 98 animals were used (on the assumption that one journey per animal was made). As eight villages from the Kynopolite nome provide donkeys, this gives an average of about 12 animals per village. It is likely that similar loads were carried on the other 5 days.

We have no direct evidence for how animals were allocated to particular granaries for clearance, but it seems from the evidence we do have that, once responsibilities were apportioned, transport took place quickly. It was also concentrated into a particular part of the agricultural year, around harvest time. Naturally, therefore, patterns of transport were dictated by seasonal factors. Our third-century ostraca from the Fayum show that transport from granaries to harbours took place throughout the year, but peaked during the

⁹⁴ Noted by H. Thompson, *Transport of Government Grain*, 89.

months Tybi to Pharmouthi (January to April).⁹⁵ This was the period leading up to the beginning of the grain harvest, and it is likely that there was an increase in the intensity of transport operations in order to clear granaries of grain from previous years' harvests to make room for the new crop. There is a considerable drop in the number of transport journeys during the month of Pachon (May), when the harvest was at its peak. No doubt animals were being used in the harvesting process.⁹⁶ Another factor in the pattern of transport must surely have been the availability of animals. We have seen from other texts discussed above that granaries in villages seem to have been fully cleared in one operation, at which point animals would move on to the next granaries. It is likely that transporters were keen to finish off their responsibilities to the state in order that they might return to their land and their own agricultural tasks with their animals, for of course, this was the pool of animals from which the state tapped.

In terms of granary clearance, the Fayum is unlikely to have been typical of the rest of Egypt in this respect. It was not affected by the annual flood; transport by land was therefore not interrupted. So how was grain transport organized in other parts of Egypt affected by the inundation? Here we run into the problems caused by the geographical distribution of our evidence, which has left little from the Nile Valley. There is, however, one papyrus from Oxyrhynchos which sheds light on the pattern of land transport and granary clearance, but there are a number of difficulties of interpretation, and in many ways it throws up as many questions as it answers. It preserves the minutes of proceedings held before the prefect Subatianus Aquila, probably in the course of his *conventus* in the year AD 208, and provides an interesting account of how transport was organized, while also showing that prefects often were ignorant of local administrative matters. The text runs as follows:

Year 16. Phamenoth 16. Extract from the minutes of Subatianus Aquila in the Oxyrhynchite nome. Inter alia: Aelius Ammonius, *prytanis*, said: 'This canal of ours which is adjacent to [because of?] the inundation has an influx

⁹⁵ See *O. Oslo* p. 43; *O. Lund* p. 62.

⁹⁶ See Schebel, *Die Landwirtschaft*, 162–7 for the harvest. On the month of Pachon as a low point in the transport process, see *P. Col.* VII p. 96 and Börner, *Der staatliche Korntransport*, 30.

and super-abundance of water. We ask that at the time vessels should be sent and the canal villages cleared first by means of this canal and that subsequently the customary system according to peg be worked, beginning with accordance with usual practice with the upper toparchy, and that each granary be emptied and the grain transported to the usual destination.' Aquila said: 'What is the peg system?' Ammonius replied: 'Each area begins from the south.' Aquila said: 'From the upper toparchy?' Ammonius replied: 'Yes, for this has always been the usual procedure and has been maintained, namely that there should be no jumping from village to village but that they should be emptied in keeping with the rise of the water and the villages adjacent to the Tomis canal be cleared first.' Aquila said to Didymus the *strategos*: 'Why was this not done?' Didymus replied: ...and he said to Didymus the *strategos*: 'Where are the present arrears, those that have not yet been despatched? In what districts?' Didymus the *strategos* said: 'In the lower toparchy.' Aquila said to Ammonius: 'If you were exposing some misdemeanour, I should have reprimanded him. It is hardly a matter for question that this needs careful watching.'⁹⁷

It seems that in this case, the *prytanis* accuses the *strategos* of the Oxyrhynchite nome of allowing deliveries of grain to fall into arrears through his failure to adhere to the usual procedure for clearing granaries, known as the 'peg system' (τὸ κατὰ πάσσαλον). This is the only reference to this procedure in the published papyri. It seems that granaries close by the Tomis Canal, the Bahr Yusef, had to be cleared first, followed by the other granaries of the nome beginning with those in the south. The implication is clear, that the system depended for its timetable on the rise of the Nile and was designed to provide an orderly clearance of granaries rather than having transporters 'jumping around' from granary to granary in an ad hoc fashion. The peg was possibly a measuring rod of some description used to measure the height of the River Nile.⁹⁸ It is unclear how the system worked, but it is possible that measurements of the height of the flood were taken and, basing their timetable on previous floods, officials knew how long they had to organize granary clearance. The operation would begin at a certain points in the Nile's rise, and as levels rose, granaries would be cleared in order. This would mean, at

⁹⁷ *P. Oxy.* XXII 2341 (AD 208) (trans. Roberts).

⁹⁸ This raises the question of the relationship, if any, between these measurements and those taken from Nilometers, but there is not enough evidence to form any conclusion.

least in spirit, that the most effective use of a limited number of transport animals could be made and no time would be wasted for ships waiting in the harbours for their full loads. Rather than there being a trickle of loads arriving, ships could be filled in one operation. Although not subject to annual flooding, granaries in the Fayum were cleared in a similar way, in that granaries were emptied in a particular order so that the most efficient use could be made of available resources and to cut down the length of time ships waited in harbours. Such a system would also have made it easier for officials to organize various stages of grain transport. It is interesting to note at this point the rather worried requests of an official in charge of loading ships to a tax collector, made in a fragmentary letter from the Fayum dating to the first century AD. In it he requests that the tax collector stops sending grain to the port, as there is not enough storage space, and porters are having to work night and day in order to fill the ships. While it is certain that state officials would not want to waste time and would want to make the most efficient use of resources, it seems from this example that officials were under some stress.⁹⁹ Equally, it shows that the system did not always function smoothly.

A number of other important issues arise from this document. First is the role of town councils in grain transport, further evidence of devolvement of responsibility which developed still further as the third century progressed. The second is the ignorance of the prefect Subatianus Aquila concerning the 'peg system'. This may indicate that the system was a local one and not widespread, although it is difficult to imagine that other nomes lying near the Nile did not have such organization. Aquila had been prefect since October or November AD 206, and two years was surely enough for him to have at least some appreciation of how grain was collected and transported, given its importance to Rome. It may be that there was a requirement in legal proceedings to explain exactly what the system was, although it is equally possible, given the complicated and diverse nature of the administration of Egypt, that the prefect merely needed to be reminded of particular details or problems.¹⁰⁰

⁹⁹ *SB XIV/I 11371* (first century).

¹⁰⁰ For one prefect's experience of complicated and diverse matters, see the well-known comments of Philo, *In Flaccum* 1. 3.

The receipt of grain at harbours

It remains to consider what happened to grain as it reached harbours, as we have so far traced its journey from threshing floors to granaries, and its onward transport. In the discussion of *P. Hamb.* I 17 above, we saw how grain was transported to the harbour of the Sacred Grove at Arsinoe. We noted that *naukleroi* probably had no responsibility for the transport of grain over land. Probably our best evidence comes from a substantial papyrus from the Fayum, *BGU* III 802, dating to AD 42. Some 22 columns of text record the delivery to the harbour of the Sacred Grove at Arsinoe of grain and other foodstuffs and its onward shipment by canal to the main harbour at Ptolemais Hormou. The account was drawn up by the harbour guards of the Sacred Grove, who kept careful record of consignments sent by the *sitologoi* of villages. The papyrus raises much of interest concerning the transport of grain. It shows the division between the competence of those officials responsible for transporting grain by land and the *naukleroi*, who were responsible for its onward shipment by canal or river. It is clear that the harbour guards received animal loads on consignment from the *sitologoi* at the granaries of Fayum villages, and that they passed on cargoes to *naukleroi*, who have no responsibility for any transport prior to their receiving grain at the port. However, it would be important to our understanding of grain transport if we had more evidence concerning one main issue, whether cargoes were assigned to *naukleroi* in advance and that grain was not transported to harbours until it was established who would be responsible for its onward shipment. It seems probable that this was the case, and that it was the responsibility of the harbour to assign loads to *naukleroi*. There is some evidence to suggest that liturgists known as *epiplooi* might have been responsible for the allocation of cargoes, as they seem to have been involved in the loading of cargoes and in guarding them during their journey by river.¹⁰¹

¹⁰¹ See J. Frösén, 'Chi è responsabile? Il trasporto del grano nell'Egitto Greco e romano', *Ann. Fac. Lett. Fil. Perugia* 18 (1980), 163–76; id., 'Le transport de blé et le rôle des epiplooi', *Arctos* 12 (1986), 5–17; A. Swiderek, 'The responsibility of corn transport to Alexandria: Σιτολόγοι, Ἐπίπλοοι, Δειγματοκαταγωγείς', *Eos* 58 (1969/70), 63–6.

The procedure is well illustrated by *P. Hamb.* 17; the account covers the period of about 4 weeks in July and August, and the entry for each day begins with the delivery by donkey of loads from each *sitologos*. A summary at the end of the document gives the total of grain and foodstuffs delivered, followed by the amount of produce transferred and shipped, the cost of shipping, and finally the balance of produce left in store.¹⁰² All of the villages which are recorded as sending grain are in the Themistos and Polemon divisions of the Arsinoite. It is likely that villages from the Herakleides division sent their grain to other ports—possibly Kerke and Leukogion, as seen when discussing the transport memoranda above. In short there was a flurry of activity, transport animals emptying granaries in rotation, and grain being loaded onto ships at harbour.

The frantic pace of transport continued at the ports, and is well illustrated by the document mentioned above concerning the concerted efforts of porters working day and night to load ships.¹⁰³ Porters (*σακκοφόροι*) loaded the grain onto ships,¹⁰⁴ and ships' captains issued receipts for the cargoes to nome *strategoï* or royal scribes.¹⁰⁵ This process is shown by a papyrus from Oxyrhynchos, which itemizes the delivery and loading of 10 000 artabas of grain over an 8-day period.¹⁰⁶ The cargo had been assigned by an *epiploos*, and this points to important changes that seem to have been made in the organization of grain transport.¹⁰⁷ *Epiplooi* in the first century were usually, if not always, soldiers, and this text is the first example of a non-military *epiploos*. It may be possible again to link these to Trajan.¹⁰⁸ Further developments took place over time, when we find un-named officials in charge of the loading of grain (*embole*),¹⁰⁹ and later in the third century when we find these responsibilities formalized as the remit of the *embolarch*.¹¹⁰ The tightening up of the

¹⁰² See Johnson, 'Roman Egypt', 408, for a table of figures representing the summary given in the document.

¹⁰³ *SB XIV* 11371 (first century BC).

¹⁰⁴ See, e.g. *P. Tebt.* I 39; *P. Lond.* I 44 (p. 33); *PSI IV* 314; *BGU I* 286; *BGU I* 307.

¹⁰⁵ See the list in Meyer-Termmer, *Die Haftung der Schiffer*, 90–103.

¹⁰⁶ *P. Oxy.* XXXIII 2670 (AD 127).

¹⁰⁷ See *P. Lond.* II 256(a) (p. 98) (AD 15); *P. Oxy.* II 276 (AD 77).

¹⁰⁸ See J. Schwartz, 'Le Nil et le ravitaillement de Rome', *BIFAO* 47 (1948), 188.

¹⁰⁹ *P. Oxy.* XVII 2125 (AD 220/1).

¹¹⁰ *P. Oxy.* LI 3612 (AD 271–5).

process of embarking grain, along with similar regulations in the organization of its transport by land, shows the concern of the Roman authorities that the process ran smoothly, but didn't always mean that it did so.

THE FINAL STAGE: TRANSPORT TO ALEXANDRIA

Once the grain was loaded, ships' captains (*naukleroî*) were responsible for its transport to Alexandria, and also that their cargoes remained intact and free from adulteration; at the Alexandrian port it was received for transfer onto seagoing vessels for the journey to the harbours of Rome.¹¹¹ A careful distribution of duties was made, and again the most noticeable factor is centralized control. This is seen most clearly in a document dating to AD 118, where it is clear that ships belonging to *naukleroî* were assigned to particular nomes.¹¹² The writer of the document, the *naukleros* Papeireis, owned a vessel with 4000 artabas burden, which had been so assigned, but owned others with a total capacity of 80 000 artabas, which must have been assigned elsewhere. There are other examples of *naukleroî* who provided several ships.¹¹³ The office in control of shipping was that of the *procurator Neaspoleos*, and no doubt its task was made more easy by another point illustrated by Papeireis' letter, that *naukleroî* were organized into an association, of which he had been appointed priest. In another document, close cooperation by *naukleroî* assigned to a nome is implied, for two men are styled presidents of the *naukleroî* of the Arsinoite nome.¹¹⁴ To what extent these associations were similar to the *corpora naviculariorum* attested elsewhere in the empire is unclear, although it seems apposite to

¹¹¹ See Meyer-Termeer, *Die Haftung der Schiffer*. Contracts stipulated, for example, that safe harbours would be found each night for the duration of journeys.

¹¹² *P. Giss.* I 11 = *W. Chr.* 444 = *Sel. Pap.* II 423.

¹¹³ *P. Oxy.* X 1259 (AD 211/2) in which a total of 8 ships have a capacity between them of 40 000 artabas, and *P. Oxy.* XVII 2125 (AD 220/1) where 3 ships carry 15 000 artabas. Ships of some 5000 artabas-burden seem to have been common. On the size and nature of Nile river vessels, see Casson, *Ships and Seamanship in the Ancient World*, s.v. Nile.

¹¹⁴ Both are citizens of Alexandria, see *P. Col.* II 1 recto 4 x (AD 155). *P. Wash.* I 80 (third century) (*BL* X 283), contra ed. princ., does not concern a guild, but rather requisitioned cargoes, see Lewis, 'Notationes legentis', 119–20.

suggest that Roman authorities in Egypt may have been hesitant to allow the same degree of freedom of organization and action which might have been found outside Egypt. It has been argued that 'guilds' in a rigid sense did not exist among land transporters, largely because of the reliance of the state on liturgists, but *naukleroi* were not liturgists, and what we see here is the state merely seeking the most expedient system of transport.

CONCLUSION

Careful and central control was at the heart of the organization of grain transport. Animals were provided for the state's use through a system of requisition: the provision of animals, their driving, their collection, allocation to tasks, and most other facets of the system, were the subject of liturgies. Two features are prominent: first, that the responsibility for and performance of nearly all transport fell on the shoulders of the local population (a pattern which is clear in other state transport demands), and increasingly the organization of the system too was devolved (in the third century onto town councils); and, second, transport resources were stretched to their limits. There were simply not enough animals to perform all tasks as directed, and therefore animals from other nomes supplemented those in the Arsinoite, and all were worked extremely hard in the short time available. This highlights two features of the transport economy which will become clear in the following pages: first, as far as our evidence goes, animals were worked much harder in Egypt than they seem to have been in other parts of the Mediterranean world (which may be connected to the peculiarity of Egyptian agriculture and its perennial expectation of surplus); and, second, that if the Arsinoite nome had had enough animals to undertake the transport of all tax-grain, then many would have been idle at other points of the years, which does not make economic sense.

Finally, it should be stressed that the efforts of the state to ensure an efficient transport system for tax-grain, demonstrated in many different ways outlined above, were fine in principle. It is easy to assume that all worked smoothly, but the reality is very different from

the aspirations of state officials. Indeed, it is evident that many of the documents discussed above linked with the system are actually concerned with either abuses by local officials or the failure of liturgists to carry out their duties. It seems clear that, more often than not, the system didn't work, and that this failure generated a substantial portion of the documents preserved.

Deserts and Military Supply

Transport is an essential factor in the important question of how communities within Egypt were supplied, and here we will consider the desert regions. They deserve separate treatment, for in both the Eastern and Western Deserts no community was self-sufficient. They relied on supplies from the Nile Valley, and for the Eastern Desert, to a much lesser extent, the Red Sea coast. The important point is that transport in these arid regions was difficult, and thus entailed significant state involvement.

TRANSPORT AND SUPPLY IN THE EASTERN DESERT

The Roman period saw a huge increase in economic activity in the Eastern Desert, mainly in the region between the southern reaches of the Nile Valley (roughly south of Panopolis) and the Red Sea coast. This increase took place very soon after the annexation of Egypt by Augustus, a point clearly made by Strabo, who notes a large increase in maritime activity, presumably because of the opportunities afforded by the *pax Augusta*.¹ The Eastern Desert was not only important as a conduit for trade; its rich mineral deposits and stone had been the focus of exploitation from the Pharaonic period. Under the Ptolemies it is clear that such exploitation continued, and possibly

¹ Strabo 2. 5. 12. On imperialism and the Roman economy, see G. Woolf, 'Imperialism, empire and the integration of the Roman economy', *World Archaeology* 23 (1992), 283–93.

gathered pace after the discovery of the monsoon winds, attributed to Eudoxus of Cyzicus.² Under the Romans, the trade routes between Egypt and the east became busier, and this demanded the development of a road infrastructure to facilitate traders. Also, the region was militarily important, and, in order to prevent incursions from nomadic tribes, there was a constant, if limited, military presence. This too demanded logistical support. Roman emperors were very quick to realize the quality of building stone available to them from the Eastern Desert, and they continued to exploit this valuable resource. Of course, any incidental profit that could be made from trade in the region, whether through taxation or otherwise, was not unwelcome.

There has been considerable scholarly interest in the Eastern Desert.³ Most has considered trade, Roman policy, or the administration of mines and quarries. Transport is of clear importance, but has only received incidental study. This chapter will consider the evidence for state-sponsored transport, its nature, organization, and facilitation.

The quarries of Mons Claudianus and Mons Porphyrites have been the focus of intense investigation through excavation and survey. There is little however, that archaeology can reveal about the nature of transport to and at the sites. There is clear evidence for loading ramps, to facilitate the transferral of the quarry produce, presumably onto wagons, and there are the remains of animal lines and stabling

² L. Mooren, 'The date of SB V 8036 and the development of Ptolemaic maritime trade with India', *Ancient Society* 3 (1972), 127–33.

³ The most recent treatment of trade is Young, *Rome's Eastern Trade*, with a substantial bibliography. However, this adds little of substance to the earlier Sidebotham, *Roman Economic Policy*. There is an ever-growing literature on the quarries and routes of the desert, most recently V. Maxfield and D. Peacock, *The Roman Imperial Quarries: Survey and Excavation at Mons Porphyrites 1994–1998* (London, 2001) to which should be added: S. E. Sidebotham, 'Newly discovered sites in the Eastern Desert', *JEA* 82 (1996), 181–92; S. E. Sidebotham, R. E. Zitterkopf, and C. C. Helms, 'Survey of the Via Hadriana: the 1998 season'; Sidebotham *et al.*, 'The Roman quarry and installations in Wadi Umm Wikala and Wadi Semna'. Recent discussion of a number of main themes relating to the region can be found in O. Kaper, *Life on the Fringe*. An accessible discussion of the desert regions of Egypt is R. B. Jackson, *At Empire's Edge: Exploring Rome's Egyptian Frontier* (New Haven and London, 2002). A recent survey of archaeology at Berenike is Sidebotham and Wendrich, 'Berenike: archaeological fieldwork at a Ptolemaic–Roman port'. On the Koptos–Myos Hormos route, see Cuvigny, *La Route de Myos Hormos*.

facilities. There is also the evidence of animal remains in the faunal assemblages. But this can only give a limited picture. It may be true, however, that 'the best way to get to know a story is to read it'; perhaps it is better still to put documentary and archaeological evidence together.⁴ We must turn, therefore, to the copious documentary evidence from Mons Claudianus and supplement this with other relevant documents from elsewhere in the Eastern Desert and papyri from the Nile Valley.

The documentary evidence, due to its abundance, is at first sight, encouraging. We have some 9000 ostraca from Mons Claudianus alone (of which just over 630 are published), rather fewer from the other Eastern Desert sites, and a number of particularly revealing documents on papyrus. However, the documents are frustrating in that they reveal little direct evidence for transport and in many ways throw up more questions than answers. The ephemeral nature of ostraca, even more striking than with papyri, is particularly problematic. General points can be made easily. There was certainly regular communication between the desert sites and the Nile Valley, but also between the principal sites like Mons Porphyrites and Mons Claudianus and their satellite stations. It was from the Nile Valley and the Red Sea that they received their supplies, and this, as we would expect, entailed bureaucracy which generated substantial quantities of documentation. Transport and travel in the desert seems to have been closely monitored by the state, presumably for reasons of security. And patterns of transport on the routes to the quarries are different to those found on other desert routes dedicated in the main to trade, as the quarry sites were administered by the state. There is little sign of the private trade and enterprise, which characterizes and dominates the routes from Koptos to the Red Sea coast.

Other documents add to our picture. Ostraca have been found at many sites in the Eastern Desert: Wadi Hammamat and Wadi Fawakhir are perhaps the most significant, as they provide important information on both quarrying and military life in the regions.⁵ But

⁴ A. Bülow-Jacobsen, 'Traffic on the roads between Coptos and the Red Sea', in Kaper, *Life on the Fringe*, 63.

⁵ F. Kayser, 'Nouveaux texts grecs du Wadi Hammamat', *ZPE* 98 (1993), 111–56 = *SB XXII* 15639–700; O. Guéraud, 'Ostraca grecs et latins de l'Wâdi Fawâkhir', *BIFAO* 41 (1942), 141–96.

important discoveries have also been made at el-Zerqa (Maximianon), el-Muwayh (Krokodilo), and, most recently, Berenike.⁶ Inscriptions from the region, and papyri from the Nile Valley, further supplement this material.

Transport of stone

Perhaps the most impressive feat in terms of transport and technology achieved by the Romans was the transport of stone from the quarries of the desert to the Nile Valley, the first leg of their journey to Rome, where they adorned imperial buildings such as Trajan's Forum and Hadrian's Pantheon. There is neither clear evidence for how such transport was achieved (our ostraca fall short on detail) nor, predictably, any scholarly consensus. The archaeological record has left little except loading ramps and stations with animal lines, which offer some insight on transport techniques.

The slipways and loading ramps at Mons Claudianus have been comprehensively studied by David Peacock.⁷ The slipway systems generally took the line of least resistance from the quarries to the wadi floor. This has meant that they are exposed to the elements, and in many cases are therefore quite poorly preserved. Cairns placed at regular intervals may have marked the route or were perhaps dumps of road metalling. What seems clear is that the loading ramps served as a medium for the transferral of stone columns onto wagons. The heights of the loading ramps suggest that there may have been two sizes of wagon used, but it is certain that they were large. An unpublished ostrakon from Mons Claudianus (*O. Claud.* inv. 0.7334) mentions a 12-wheeled wagon.⁸ Peacock argues convincingly that

⁶ For Maximianon, see Bülow-Jacobsen *et al.*, 'The identification of Myos Hormos', and Cuvigny, *La Route de Myos Hormos*, 100–26. For Berenike, see *O. Ber.* I, where most of the documentary evidence found during excavations at Berenike from 1996–8 is published.

⁷ D. P. S. Peacock and V. Maxfield, *Mons Claudianus: Survey and Excavation* (Cairo, 1997), 259–61. For earlier work, see M. J. Klein, *Untersuchungen zu den kaiserlichen Steinbrüchen aus Mons Porphyrites und Mons Claudianus in der östlichen Wüste Ägyptens* (Bonn, 1988), 51.

⁸ This document is frequently mentioned in the literature, see Peacock and Maxfield, *Mons Claudianus*, 262; D. Bailey, 'Honorific columns, cranes, and the Tuna epitaph', in id. (ed.), *Archaeological Research in Roman Egypt*, 155; Adams, 'Who bore the burden?', 176.

such a wagon could bear the weight of even the largest columns from Mons Claudianus (the largest is estimated to weigh 207 tonnes), and that it is unlikely that rollers were used for the transport of stone from the quarries to the Nile Valley.⁹ Such a wagon could have been some 18 metres long, with a wheel gauge of at least 2.8 metres. Ancient wagon tracks, perhaps left by wagons used for transporting stone, were found by both Murray and Tregenza in the Eastern Desert. These had a gauge of 9 ft and 7 ft 6 in, and were comparable to those found later by Sidebotham.¹⁰ On balance, it seems likely that wagons were used to transport quarry products in the Eastern Desert.

What is less certain is how these great wagons were pulled. Oxen, the animals most associated with traction, can be discounted.¹¹ The arid climate of the desert would have been unsuitable for oxen and horses, both in terms of their physiology and of their maintenance requirements. It is not surprising, therefore, that very few bovine remains have turned up in the faunal assemblage at Mons Claudianus.¹² Donkeys were commonly used for draught purposes in Roman times. The agricultural writers Varro and Columella note as much, although it is clear that they are referring to ploughing or hauling sheaves.¹³ These are what might be considered light-haulage

⁹ Peacock and Maxfield, *Mons Claudianus*, 262–3. On methods of stone transport, see further M. Wurch-Kozelj, 'Methods of transporting blocks in antiquity', in N. Herz and M. Waelkens (ed.), *Classical Marble: Geochemistry, Technology, Trade* (Dordrecht, 1988), 55–63; C. St. C. Davison, 'Transporting sixty-ton statues in early Assyria and Egypt', *Technology and Culture* 2 (1961), 11–16; and on technology in general Cotterell and Kaminga, *Mechanics of Pre-industrial Technology*, esp. 216–33.

¹⁰ Tregenza, *The Red Sea Mountains of Egypt*, 213; G. W. Murray, 'Roman roads and stations in the Eastern Desert of Egypt', *JEA* 11 (1925), 140; id., *Dare Me to the Desert*, 120; Sidebotham, Zitterkopf, and Riley, 'Survey of the 'Abu Sha'ar-Nile Road', 598; Sidebotham, 'Newly discovered sites in the Eastern Desert', who notes gauges of 2.3 metres and 4 metres, possibly of a three-wheeled cart (or multiple of three). This last may represent evidence for the 12-wheeled wagon mentioned on the Claudianus ostrakon.

¹¹ Oxen have been suggested by earlier work: Klemm and Klemm, 'Roches et exploitation de la pierre dans l'Égypte ancienne', 36, probably following, for the Roman period at least, T. Kraus and J. Röder, 'Voruntersuchungen am Mons Claudianus', 742.

¹² Maxfield, 'Stone quarrying in the Eastern Desert', 158.

¹³ Varro, *De Agricultura* 2. 4. 5: 'ad agri culturam, ubi quid vehendum est, aut etiam ad arandum'.

tasks. While the donkey was certainly the most favoured pack animal in the Roman period, it was the stronger mule that was more commonly used for pulling carts.¹⁴ There is no evidence, however, for the presence of mules in the faunal assemblage or in the ostraca, and it is therefore unlikely, especially given their rarity in Egypt, that mules were used. In his discussion of traction, Peacock concludes that donkeys must have been the animals favoured for hauling quarry produce, but given that large numbers of animals would need to be harnessed, he suggests that donkeys might be used to haul lighter loads, but that the heavy columns would be hauled by men, supported logistically by animals carrying food and water. He notes the long tradition of human haulage in Egypt, and suggests that the heaviest columns might have been hauled by some 360 men, perhaps fewer, given the use of wagons.¹⁵ In support of this argument, the famous tomb relief of Djehutihotep at Deir el' Bershah in Middle Egypt is cited. This Middle Kingdom relief (now lost but preserved on a 19th-century lithograph) depicts lines of workman hauling a colossal statue, estimated to weigh some 60 tonnes.¹⁶ Also cited is a New Kingdom inscription of Ramesses IV from Wadi Hammamat, which records that 8368 men were directed to haul stone blocks, and of these 900 perished.¹⁷

There is, however, compelling evidence suggesting that in the Roman period animal traction was used.¹⁸ Three papyri are central to the argument. The first, dating to AD 118, is an urgent request for barley to feed animals in what seems to be an ongoing operation to transport a column from Mons Claudianus.¹⁹ The writer states that

¹⁴ J. Clutton-Brock, *Horse Power* (London, 1992), 118, quoting evidence from the *Theodosian Code* (8. 5. 8, 47).

¹⁵ Peacock, *Mons Claudianus*, 263–4. Peacock's arguments are supported and augmented by Maxfield, 'Stone quarrying in the Eastern Desert', 157–65.

¹⁶ There are many problems of interpretation, see Cotterell and Kaminga, *Mechanics of Pre-industrial Technology*, 220–1. It is likely that the relief is symbolic, and any conclusions drawn on the mechanics of transport are shaky.

¹⁷ See L. Christophe, 'La stele de l'an III de Ramsès IV au Ouâdi Hammamat', *BIFAO* (1949), 1–38.

¹⁸ Peacock, *Mons Claudianus*, does not fully account for the papyrological evidence, and Maxfield, 'Stone quarrying in the Eastern Desert', glosses over it.

¹⁹ P. Giss. III 69, with J. T. Peña, 'P. Giss. 69: evidence for the supplying of stone transport operations in Roman Egypt and the production of fifty-foot monolithic column shafts', *JRA* 2 (1989), 126–32. The column described is 50 ft long, and must therefore come from Mons Claudianus.

‘we have a great number of animals for the purposes of bringing down a fifty-foot column.’²⁰ Although the phrase is ambiguous, the likeliest explanation is to understand the animals to be performing the transport, especially given the use of the noun *καταγωγή* (‘a carrying down’), which in the papyri is used to describe the transport of grain. In the papyri, the use of the composite or prefix *κατα* denotes ‘downriver’ when used in the Nile Valley, and down from the mountains or desert when used elsewhere.²¹ Perhaps more instructive on the mechanics of transport are two papyri from Soknopaiou Nesos. Both are camel registration documents dating to AD 163. In both cases, a camel has been requisitioned on the orders of the prefect, the little known Annius Syriacus, ‘for the purpose of hauling down a porphyry column.’²² A number of points are clear: that these animals were requisitioned for the same transport operation, and that both were used to haul the column. This can be the only interpretation of the verb *καθέλω*, which has the usual meaning of ‘to drag ships’.²³

Elsewhere in the papyri there is evidence for the use of wagons and animals in the transport of stone. In a third-century text from Oxyrhynchos, which preserves estimates for the cost of repairs to a public building, stone blocks are referred to as ‘large and portable’ or those which could be carried by wagons.²⁴ We can be confident that animals will have been used to pull wagons laden with such blocks, even if we cannot be sure how ‘large and portable stones’ were transported. In a fourth-century private letter, an estate owner ordered that her oxen be used to haul stone.²⁵ Finally, an interesting second-century text, again from Oxyrhynchos, preserves a contract between Antonia Asclepias and a group of stone cutters. The latter

²⁰ Ll. 13–14: *ἐπεὶ διὰ τὴν τοῦ πεντηκοντάποδος στύλου καταγωγὴν πλείστα κτήνη ἔχομεν.*

²¹ My thanks to Prof. Adam Bülow-Jacobsen for pointing this out to me.

²² *BGU* III 762 and *P. Lond.* II 328. In both, the Greek is virtually identical: *ἐπὶ μεθοφορὰ πρὸς χρεῖαν τοῦ καθελ(ι)κομένου κ(ε)ῖονος πορφυρ(ε)τικῆς ἐξ ἐγκελεύσεως τοῦ λαμ(προτάτου) ἡγεμ(όνος) κάμηλος εἰς.*

²³ Maxfield, ‘Stone quarrying in the Eastern Desert’, 158 glosses over this: ‘The size of the pillar or role of the animal—pack or haulage—is not indicated.’

²⁴ *P. Oxy.* XXXI 2581: *λίθοι μεγάλοι φορτιαῖοι; ἀμαξιαῖοι.*

²⁵ *P. Oxy.* XLVIII 3407: we can be sure that the animals were used to haul rocks—the verb used is *κύρω*.

undertake to supply stone-blocks of various sizes, including ones described as ‘camel-stones’.²⁶

The major objection to the use of animals to haul stone in the Eastern Desert is the supposed lack of efficient harnessing systems in the ancient world, and the need to harness large numbers of animals.²⁷ There are a number of important points to be made, however. First, animals were regularly harnessed together in the ancient world. Teams of oxen were used to haul stone at Epidaurus in the fourth century BC, and in the *Theodosian Code*, it is clear that teams of 10 mules were regularly used to pull post-carriages in the difficult winter months when road conditions could be demanding.²⁸ We know that 33 teams of oxen were harnessed in yokes in stone transport works at Eleusis in the fourth century BC and that Alexander the Great’s sarcophagus was hauled by 64 mules.²⁹ Second, it is likely that camels were used as draught animals and it is clear that they could pull considerable loads—around 1000 kg.³⁰ Indeed, they are more efficient draught animals than oxen or horses, and clearly come into their own in arid conditions.³¹ In recent times, camels have proved their worth in this capacity. In nineteenth-century Australia, up to 12 pairs of camels could be harnessed together, and an additional benefit in logistics was that they did not need to be unharnessed each night. Camels proved to be better work animals than horses; their notoriously obstinate nature means that ‘if a team

²⁶ *P. Oxy.* III 498: λίθων κύβων καμηλικῶν—the masons undertake to cut ‘the square building stones transportable by camel’. It is not clear whether the blocks were to be carried or hauled, but we should note that camels can haul more than they carry, and that it is not pushing the evidence to suggest that such blocks could have been placed on wagons, as in *P. Oxy.* XXXI 2581, noted above.

²⁷ Peacock, *Mons Claudianus*, 264; Maxfield, ‘Stone quarrying in the Eastern Desert’, 158–9.

²⁸ Burford, *The Greek Temple Builders at Epidaurus*, 184–91; *Cod. Theod.* 8. 5. 8.

²⁹ *IG ii²* 1673 (c.330 BC), with J. Salmon, ‘Temples the measure of men: public building in the Greek economy’, in D. J. Mattingly and J. Salmon, *Economies beyond Agriculture in the Classical World* (London and New York, 2001), 200–1; Diodorus Siculus 18. 26–7, with G. Raepsaet, ‘Transport de pierres en Grèce ancienne: de la carrière au chantier’, in E. Vanhove (ed.), *Marbres Hellenique: De la carrière au chef-d’oeuvre* (Brussels, 1989), 38–9.

³⁰ Noted by Bulliet, *The Camel and the Wheel*, 195–6; Maxfield, ‘Stone quarrying in the Eastern Desert’, 159.

³¹ Cotterell and Kaminga, *Mechanics of Pre-industrial Technology*, 206–8, estimate that a camel has c.1.7 times the power of a horse.

of camels in harness could not at first move a heavy laden wagon, unlike horses, they would try and try again'. They could pull impressively heavy loads. 'On ordinary roads a team of 14 camels could pull a wagon load weighing 14 metric tons, but if the road was very good they could pull 20 metric tons. In dry weather they covered 50 kilometers with an empty wagon and 30 kilometers with a loaded one.'³² Third, the efficiency of ancient animal harnessing is usually underestimated. Lefebvre des Noëttes argued that before the introduction of the withers strap and modern horse collar, horses were unable to pull heavy loads.³³ Modern work has largely discredited these arguments, which were based on inadequate experiments and an unsound interpretation of Diocletian's *Edict of Maximum Prices*.³⁴ Raepsaet has demonstrated that good traction could be obtained. A pair of oxen was capable of hauling between 500 and 1000 kg. Not only that, but if harnessed in file, and depending on terrain, they could pull 10 tonnes, perhaps even more.³⁵ It has been calculated that camels could exert more than twice the pulling power of a horse, and nearly three times that of an ox.³⁶ Camels can be harnessed efficiently, and, although in modern times yoke harnessing is used, it has been noted that a yoke harness secured behind the hump would not affect their tractive efficiency, and thus in the ancient period they would have been equally efficient as they are today.³⁷ Finally, if we accept that human traction was used, we have to admit that there had been little technological progress between the Egyptian Middle Kingdom and the Roman period, and this can certainly be questioned.

On balance, it seems likely that camels were used to haul the products of the quarries at Mons Claudianus and Mons Porphyrites.³⁸ It is clear that a large number of animals could be harnessed in file, that sufficient traction could be obtained, and that perhaps as few as 40 camels could easily transport one of the large

³² Gaultier-Pilters and Dagg, *The Camel*, 126–7.

³³ Lefebvre des Noëttes, *L'Attelage*, *passim*.

³⁴ Spruytte, J., *Early Harness Systems*; Raepsaet, *Attelages*.

³⁵ Raepsaet, *Attelages*, 277.

³⁶ Raepsaet, *Attelages*, 33, following Cotterell and Kamminga, *Mechanics of Pre-industrial Technology*, 38. Camels can exert 1200 N, horses 520 N, oxen 410 N. Unfortunately, Raepsaet largely ignores camels in his study.

³⁷ Cotterell and Kamminga, *Mechanics of Pre-industrial Technology*, 38.

³⁸ As argued in Adams, 'Who bore the burden?'

columns from Mons Claudianus. Finally, we should note that there is no mention in the documentary or literary record of human traction in the quarries. A number of ostraca from Mons Claudianus mention workers called *λιθοφόροι*, but it is likely that they were employed in the quarry to move rubble or small stones—they might also have been involved in the loading of columns onto ramps.³⁹ They may also have used their technical expertise to organize the haulage of stone, but it is hard to believe that they would haul stone themselves, when animals could be utilized. We can conclude that with the possession of the technical means to harness the strength of animals to haul stone, we should credit the Romans with the imagination to improve technology according to demand, and use them.

Supplying the desert

If the transport of the quarry produce represents the most challenging aspect of transport in the desert, the logistical support needed for both this and the everyday supply of the quarry settlements is hardly less so. The supply of quarries, military garrisons, and the communities at the Red Sea ports, the latter considered more fully in the next chapter, could not be left to chance; systems developed including state-directed supply, but such systems allowed private enterprise to ride on their backs. We must bear in mind that no state system could be universal, but must have varied according to numerous factors: structural changes, availability of animals and food supplies, and perhaps seasonal variations.

Despite the abundant evidence from Mons Claudianus, we know little of how the systems of supply worked, and as usual must tentatively piece together a picture from the anecdotal evidence. The ostraca from Mons Claudianus are supplemented by other material, and it can be hoped that the ongoing excavations at Eastern Desert locations will throw up important new evidence. But a picture

³⁹ *O. Claud.* II 212; 213; 218. Note the prevalence of Schmorles nodes in the human bone assemblage at Mons Porphyrites, which would be consistent with such heavy labour, see A. Macklin, 'Skeletal remains', in V. Maxfield and D. Peacock, *The Roman Imperial Quarries: Survey and Excavation at Mons Porphyrites 1994–1998*, (London, 2001), 30–5.

does emerge of a carefully planned and regular system of supply, with a significant level of central direction.

Three papyri only form the basis of our knowledge for the supply system from the point of origin in the Nile Valley, and suggest how central government structures are involved at three different levels.⁴⁰ The first is from Ptolemais Euergetis, the metropolis of the Arsinoite nome, and dates to AD 96. In this, the deputy of the *kaisaros oikonomos* confirms to a *sitologos* of the village of Magdola in the Polemon division that he has received 2089 artabas of barley which has been put aboard ship at the harbour of Kaine. The consignment was destined for the 'military services in the Thebaid and the quarrymen in the Red sea region'.⁴¹ There are a number of interesting points in this document. The involvement of members of the *familia Caesaris* must indicate central control. They were at times involved in the organization of military supply, but their principal role was in the administration of the imperial patrimonium. As quarries throughout the empire fell into this category from the reign of Tiberius, their involvement here is not surprising.⁴²

In the second document, addressed to the *strategos* of the Heptakomia, and dating to AD 118, a consignment of barley is to be collected from the nome and transported to Kaine, where animals have been gathered for the transport of a 50-foot column from Mons Claudianus.⁴³ There is good reason to accept that the writer of the document was an imperial agent.⁴⁴

⁴⁰ SB XIV 12169 (AD 96), with H. C. Youtie, 'Supplies for soldiers and stonecutters (P. Mich. inv. 6767)', *ZPE* 28 (1978), 251–4 = *Scriptiunculae Posteriores* i 437–40; *P. Giss.* III 69 (AD 118), with Peña, 'P. Giss. 69: evidence for the supplying of stone transport operations in Roman Egypt'; and *P. Oxy.* XLV 3243 (AD 214–15). Discussion with relevance to stone transport operation can be found in Adams, 'Who bore the burden?'. See also, Mitthof, *Annona Militaris*, 304.

⁴¹ SB XIV 12 169: l. 12–13: εἰς τὰς ἐν Θηβαίῳ [c]τρατιωτικὰς χρείας καὶ Ἐρυθραϊκ(οῦς) [λα]στόμο[υς].

⁴² Suetonius, *Tib.* 49. 2. See now, *Tab. Vindol.* III 645. On the *familia Caesaris* generally, see P. R. C. Weaver, *Familia Caesaris* (Cambridge, 1972). On the economic functions of the *familia Caesaris*, see G. Boulvert, *Esclaves et affranchis impériaux sous le Haut-Empire romain: rôle politique et administratif* (Naples, 1970) and id., *Domestique et fonctionnaire sous le Haut-Empire romain: la condition de l'affranchi et de l'esclave du prince* (Naples, 1974), with the review of G. Burton, 'Slaves, freedmen, and monarchy', *JRS* 67 (1977), 162–6.

⁴³ *P. Giss.* 69, discussed above.

⁴⁴ Adams, 'Who bore the burden?', 179.

Finally, a document from Oxyrhynchos, but perhaps relating to the Arsinoite nome, dating to AD 214–15, preserves a letter from a *strategos* of the Polemon and Themistos *merides* of the Arsinoite Nome to the prefect of Egypt.⁴⁵ In it he refers to an instruction from the prefect to distribute grain and to make a tally of the remaining stocks, taking into account grain already distributed to animals of troops serving in the Thebaid and for the supply of the quarrymen at Mons Porphyrites and Mons Claudianus.

The documents suggest a central organization. The prefect of Egypt was the only authority who could requisition grain or animals, and seemingly had ultimate responsibility for the administration of quarries.⁴⁶ Below him, imperial freedmen as representatives of the *familia Caesaris* could requisition goods and services in the course of their duties to supply the quarries. What seems likely is that operations were directed by these representatives based in a central office. An inscription on a door lintel, dating to the first or second century AD and perhaps from Hermopolis Magna, attests a building used by *tabularii* for Mons Porphyrites and other quarries.⁴⁷ *Tabularii* were either military personnel or members of the *familia Caesaris*, but those attached to military units in this period are attested only in the legions, rather than the *auxilia*, normally found in the Eastern Desert. It is most likely, therefore, that we are dealing here with members of the *familia Caesaris* connected to the

⁴⁵ *P. Oxy.* XLV 3243. The *strategos* states that he and his fellow *strategos* in the other *meris* had received the order, which strongly suggests that the writer had been appointed *strategos* of one of the Arsinoite *merides* as part of the normal process of appointment outside τὰ ἴδια. It is likely that the document was retained by the *strategos* amongst papers he took home to Oxyrhynchos.

⁴⁶ Maxfield, 'Stone quarrying in the Eastern Desert', 147, within a general discussion of the administration of the quarries, 147–54.

⁴⁷ See W. E. H. Cockle, 'An inscribed architectural fragment from Middle Egypt concerning the Roman imperial quarries', in Bailey, *Archaeological Research in Roman Egypt*, 23–8: Hosp[itium] Tabular[iorum] Porphy[r]itis et aliorum metallorum. The fact that Mons Porphyrites rather than Claudianus is mentioned may add weight to the suggestion of Peacock and Maxfield, *Mons Porphyrites*, 9, that Mons Porphyrites was the administrative centre of the quarries. Peña, 'P. Giss. 69: evidence for the supplying of stone transport operations in Roman Egypt', 128, suggests that the administrative centre may have been based at Kainopolis, which, on balance, seems unlikely, at least for the day-to-day running of the quarries. Supplies from the Nile Valley could have been coordinated at Kainopolis.

administration of quarries. Similarly attached agents are to be found in the ostraca at Mons Claudianus.⁴⁸

From these three documents, it seems clear that supplies were transported considerable distances, and a central office in Middle Egypt would have facilitated this. From the Fayum, grain was transported upriver to Kaine, before being taken overland into the desert. Our evidence for this stage of transport is thin. We would not expect ostraca from Mons Claudianus to offer specific details, and none are forthcoming. However, one ostrakon from Upper Egypt, a private letter from a soldier to his wife living, perhaps, in the Arsinoite nome, refers to a provisions boat, which, it is implied, travelled regularly between the Arsinoite nome and the soldier's station.⁴⁹ It is likely that such a boat would have been a civilian vessel requisitioned by the state, perhaps under similar arrangements to those requisitioned for the transport of the *annona*.

Our evidence for overland transport to the quarries is better. Supplies were carried by a caravan service, called the *πορεία*, which seems to have travelled regularly between Mons Claudianus and Kainopolis.⁵⁰ It seems clear that this service not only brought essential supplies to Mons Claudianus, but also provisioned the *hydreumata* and military outposts along the route to the quarry, such as Raima, as well as the satellite quarry sites such as Tiberiane.⁵¹ It seems possible that the same camels requisitioned for the haulage of stone would have made up the caravan service, and no doubt the delivery of supplies could have coincided with return journeys dedicated to the transport of stone. Equally, the operations may

⁴⁸ Cockle, 'An inscribed architectural fragment', cites *O. Claud.* inv. 5266, which mentions an *ἐπίτροπος Καισάρως*, and *O. Claud.* inv. 7362, a *tabularius*. A general term used commonly to describe imperial agents at Mons Claudianus was *Caesariani*, see the discussion by Cuvigny, *O. Claud.* III intro. pp. 24–9.

⁴⁹ *O. Flor.* 14, 7 (second century): τὸ πλοῖον τῶν κιβαρίων. The soldier was attached to the *cohors I Augusta Praetoria Lusitanorum Equitana* based at Contrapollonopolis Magna in the Thebaid.

⁵⁰ *O. Claud.* II 245; 273; 278; 375; 376 (all second century).

⁵¹ In *O. Claud.* II 245, Petenephtotes writes to Valerius requesting that if the caravan arrives, he is to send bread, as he does not have any. He promises to repay Valerius after the caravan has reached him, and on its return journey: ll. 3–7, ἐὰν ἔλθῃ] ἢ πορῆα τῆ νυκτὶ ταύτῃ πέμφας μοι τρία ζεύγη ἄρτων ἐπὶ οὐκ ἔχο ἄρτους καὶ ὅταν ἔλθῃ ἢ πορῆα πέμφω σοι αὐτά.

have been separate, but this would have required more requisitioned animals.

The size of the *πορεία* can only be guessed at.⁵² The size of the population of Mons Claudianus has been estimated at around 900 individuals, although we should not assume this was static. Our evidence is an ostrakon dating to the Hadrianic period that suggests a minimum figure of 730 personnel, to which must be added soldiers, advisors, other staff, and possibly dependants.⁵³ The normal ration of wheat for soldiers in the second century was 1 artaba per month, and if we accept this as a realistic figure, some 900 artabas of wheat would be required each month, and 10 800 per annum. This was a considerable transport operation, which, on the basis of normal camel loads of 6 artabas, would have required some 150 camel loads on a monthly basis, and an annual total of 1800 camel loads. The journey from the Nile Valley to Mons Claudianus was 120 km, a 10-day round trip. Certainly several journeys could be made in one month, but the return journey, possibly transporting stone, would have taken much longer. A caravan of 75 camels is known in a text relating to the Western Desert, and it is unlikely that the *πορεία* was smaller than this.⁵⁴ There is no doubt from the ostraca that the arrival of the caravan was eagerly anticipated by the inhabitants of the quarry stations for the grain it carried, but more supplies than this were needed, and we know that the caravan carried wine, oil, and many other commodities.⁵⁵ To this should be added the considerable amount of animal fodder required for the camels and donkeys of the *πορεία* and those working at the quarry sites themselves. The fodder requirements for the *πορεία* alone would have been considerable,

⁵² See Adams, 'Who bore the burden?', 184–8 for discussion.

⁵³ R. Tomber, 'Provisioning the desert: pottery supply to Mons Claudianus', in Bailey, *Archaeological Research in Roman Egypt*, 42. The ostrakon is *O. Claud.* inv. 1538 + 2921, discussed by Cuvigny, *O. Claud.* I 83–118, intro., p. 79. Tomber cites a personal communication with Cuvigny, who suggests a figure of 920.

⁵⁴ *P. Oxy.* XXXVI 2766 (AD 305), an undertaking by an *epimeletes* to organize the transport of 300 artabas of wheat and 150 of barley from Oxyrhynchos to the Small Oasis. This represents, at 6 artabas per load, a total of 75 camels.

⁵⁵ On this, see Tomber, 'Provisioning the desert', and M. van der Veen, 'A life of luxury in the desert? The food and fodder supply to Mons Claudianus', *JRA* 11 (1998), 101–16. Foodstuffs imported from the Nile Valley could be supplemented by fish from the Red Sea, and by limited gardening at Mons Claudianus itself, see M. Van der Veen, 'Gardens in the desert', in Kaper, *Life on the Fringe*, 221–42.

for c.150 camels would have consumed at least 5400 artabas of barley in one year, although this could have been reduced slightly through grazing.

Alongside the *πορεία*, a patrol known as the *προβολαί* seems to have had more than a military function. This was no doubt its primary role, as the region needed protection from bandits and restrictions on the use of roads had to be enforced,⁵⁶ but it seems also to have been used in an informal way to carry items between stations.⁵⁷ Such informal communication and transport seems to have been a common feature of life in the community.⁵⁸ Individuals took advantage of the caravan service, patrols, and those travelling between stations, and between the desert and Nile Valley, to send messages, requests, and goods to others. It is frequently attested, not only at Mons Claudianus, but all of the Eastern Desert sites. It was certainly possible to send letters and goods by way of the *προβολαί*, perhaps for a small fee in money or kind, or through friends or acquaintances. Donkey and camel-drivers appear regularly in the ostraca, and could certainly carry letters and items for others. Their exact status vis-à-vis the quarries is uncertain, but there does appear to have been some more formal organization of communication, for in one ostrakon, post-camels are mentioned.⁵⁹

TRANSPORTING MILITARY SUPPLIES

While the ostraca from Mons Claudianus have certainly revolutionized our knowledge of life in the Eastern Desert of Egypt, they also provide vital evidence for the supply of military garrisons in the desert and in Egypt generally. The subject of military supply in the Roman empire as a whole is a difficult one. Until very recently, it

⁵⁶ On such restrictions, see *O. Claud.* I 48–83, the so-called *Laissez-Passer*.

⁵⁷ *O. Claud.* II 227; 279; 375; 376; 380 (all second century).

⁵⁸ The informality and opportunistic nature is illustrated by *O. Claud.* I 139 (c.AD 110), in which the writer promises meat to a friend if he can find a way of sending it: ll. 10–11, *ἐὰν εὐρήσομεν πῶς πέμψομεν αὐτά*.

⁵⁹ *O. Claud.* I 142: ll. 6–8, *προσδέχομαι τοὺς καμήλους ἀγγαρίους ἕως ἐξέλθωσιν*.

was argued that there was not enough evidence for supply and logistics to enable a thorough treatment of military supply, at least in wartime.⁶⁰ Several comprehensive studies have sought to redress this,⁶¹ but none have considered the evidence of Egypt in detail.⁶² While there is certainly evidence that supplies from Egypt were sent to support imperial campaigns elsewhere in the empire, the papyrological evidence clearly concerns the supply of resident military units during peacetime.⁶³ It is none-the-less of great interest, especially when compared to similar evidence from Vindolanda in Britain and Bu Njem in Libya.

In our discussion of transport and communication at Mons Claudianus, it was clear that there was significant government involvement in its organization. Indeed the transport of stone in the Eastern Desert is a fine example of state-driven economic activity, which depended on the taxation of and requisition from the provincial population of Egypt. The same is true of the systems in place for the supply of food and other products to the army. Using the caravan connection with the Nile Valley, the rations of the soldiers and workers at Mons Claudianus were transported to the desert. The soldiers and imperial representatives working at the quarry were part of the *familia*, and their free monthly ration (*ὀψώνιον*) was made up of 1 artaba of wheat, 1 mation of lentils, 3 cotyles of oil, in addition to their salaries plus an annual clothing ration.⁶⁴ The *pagani*, who were

⁶⁰ A. K. Goldsworthy, *The Roman Army at War 100 BC–AD 200* (Oxford, 1996), 287.

⁶¹ P. Erdkamp, *Hunger and the Sword: Warfare and Food Supply in Roman Republican Wars (264–30 BC)* (Amsterdam, 1998); Roth, *The Logistics of the Roman Army at War*; and P. Erdkamp (ed.), *The Roman Army and the Economy* (Amsterdam, 2002). See also, C. E. P. Adams, 'Feeding the wolf: logistics and the Roman army', *JRA* 14 (2001), 465–72.

⁶² Lesquier, *L'armée romaine d'Égypte d'Auguste à Dioclétien*, 349–75, remains the classic treatment of military supply in Egypt. See also Alston, *Soldier and Society*, 110–12, which adds little of substance, and C. E. P. Adams, 'Supplying the Roman army: bureaucracy in Roman Egypt', in A. K. Goldsworthy and I. Haynes (ed.), *The Roman Army as a Community*, *JRA* Suppl. 34 (Portsmouth, R.I., 1999), 119–26. Most recently, see Mitthof, *Annona Militaris*, and on the *vestis militaris*, see *P. Col.* IX.

⁶³ But our evidence for the direct involvement of the government is not substantial, although the fact that deductions were made from soldiers' salaries might suggest it.

⁶⁴ See H. Cuvigny, 'The amount of wages paid to the quarry-workers at Mons Claudianus', *JRS* 86 (1996), 139–45; numerous ostraca are published by Cuvigny in *O. Claud.* III, which is devoted to the supply of soldiers and workers at Mons

local workers, received 1 artaba of wheat and wine.⁶⁵ The wheat ration came in the form of bread, distributed by civilians known as *kibariatores*; the bread must often have been made in ovens at Mons Claudianus itself, although this was not universally the case.⁶⁶

Such a diet, however, would have been poor fare indeed, even if it could have supplied much of the required daily calorie intake for the inhabitants of Mons Claudianus.⁶⁷ Their luck, however, was better. Indeed, theirs may have been a life of luxury. A surprising variety of foods and condiments appear in the ostraca and botanical assemblages. A variety of meats, vegetables, fresh fish, oils and clothing are the subject of exchange in a large number of private letters.⁶⁸ Wine, too, was exotic, coming as it did from Italy, Syria, and other Mediterranean sources.⁶⁹ The soldiers and well-paid workers at Mons Claudianus were able to use their considerable buying power and attractiveness to enterprising traders in the Eastern Desert to ensure an adequate supply of luxuries from the Nile Valley. This, and gardening, augmented their state-provided rations.

Claudianus. For discussion, see *O. Claud.* III, pp. 41–3. See *O. Claud.* III 432 on the allocation of clothes.

⁶⁵ There is no evidence for slave labour at Mons Claudianus or Mons Porphyrites, despite Josephus, *Bellum Judaicum*, 6. 4. 8 and Aelius Aristides, *Or.* 67 (*Aegyptos*) 5. 12. The *pagani* were free, skilled workers, usually from Syene, Alexandria, or the Thebaid, who may have been paid on a pay scale received by similar workers throughout the empire. It is possible that *pagani* had to pay for their rations, see Cuvigny, 'Amount of wages'.

⁶⁶ *O. Claud.* III, pp. 43–4, for discussion. See SB XX 13340–52; *O. Claud.* I 3–6; and *O. Claud.* III s.v., *κιβαριάτης*. See *O. Claud.* I 7–8 and *O. Claud.* inv. 4855 and 5596 for bread made in the Nile Valley, probably Syene. Roth, *The Logistics of the Roman Army at War*, 274, simply assumes *cibariatores* to be military.

⁶⁷ The best treatment of calorie requirements remains L. Foxhall and H. Forbes, *Σιτομετερία: the role of grain as a staple food in classical antiquity*, *Chiron* 12 (1982), 41–90.

⁶⁸ See *O. Claud.* I 137–71 from Mons Claudianus, and *O. Claud.* II 255–78 from Raima, for a wide selection of different foodstuffs and other items. For fish, see *O. Claud.* II 241. On this subject generally, see van der Veen, 'A life of luxury in the desert?', and ead., 'Gardens in the desert'. Other documents from elsewhere in Egypt mention vegetables being sent to soldiers: WO 1013 (AD 193) from Herakleia, and PSI VI 683 (AD 199) from the Arsinoite nome.

⁶⁹ See initially D. Rathbone, 'Italian wines in Roman Egypt', *Opus* 2 (1983), 81–98, with R. Tomber, 'Provisioning the desert'. A recently published papyrus, *P. Bingen 77* (probably second century), provides unique evidence for the import of substantial quantities of wine into Egypt by ships plying the Mediterranean.

Elsewhere in the Eastern desert, similar phenomena appear. An important group of ostraca from Wadi Fawakhir provide evidence for the everyday life of an auxiliary unit based at this quarry station, and they seem to have been most interested in food.⁷⁰ In one, an individual named Proculus wrote to his friend Valerianus boasting of his hunting exploits, the products of which he had sent to him through another soldier named Cerialis. Perhaps more importantly, on the back of this ostrakon, gardens at Wadi Fawakhir are mentioned.⁷¹ But the most significant documents concern a soldier named Rustius Barbarus.⁷² These five ostraca indicate that he was in regular contact with his friend Pompeius, probably based in the Nile Valley. Pompeius often sent bread and various other commodities to his friend, and in one document we see items being sent so that Rustius Barbarus can prepare a special festival meal.⁷³ A regular connection to the valley is perhaps implied in two documents mentioning a wagon, but it is not altogether clear whether this was similar to the state-organized *πορεία*, or a private matter. The latter is more likely, given that the wagoner in one text has an Egyptian name.⁷⁴

There is other evidence for civilian involvement in military supply. A first-century ostrakon belonging to the so-called archive of Nikanor, concerns the supply of grain to a soldier based at Apollonis Hydreuma, on the road between Koptos and Berenike.⁷⁵ In this, a soldier named Gaius Julius Longinus received 1 artaba of public

⁷⁰ Guéraud, 'Ostraca grecs et latine de l' Wâdi Fawâkhir', 141–96, discussed by R. Davies, 'The Roman military diet', *Britannia* 2 (1971), 122–42, reprinted in *Service in the Roman Army*, esp. 200–2.

⁷¹ *O. Fawakhir* 14 = SB VI 9017.

⁷² *O. Fawakhir* 1–5 = CPL 303–7.

⁷³ *O. Fawakhir* 3 = CPL 305.

⁷⁴ *O. Fawakhir* 1 and 9 = CPL 303 and SB VI 9017.

⁷⁵ *O. Petr.* 245. For detailed discussion, see C. E. P. Adams, 'Supplying the Roman army: *O. Petr.* 245'. See Mitthof, *Annona Militaris*, 295–6, who suggests that this was a liturgy. At this early date, this is not likely and implies too rigid a system. My original conclusion on the size of the garrison at c.35 men is now surely wrong in the light of recent surveys of the *praesidium*. It was the largest of those in the Eastern Desert, and the upper end of my estimates at c.215, based on the consumption of grain, is likely to be more accurate, although it is likely that the garrison was smaller in the Julio-Claudian period, as the buildings are Flavian in date and may have replaced a smaller station.

wheat, presumably his own ration and part of a monthly consignment of $35\frac{5}{6}$ loads. The transaction is effected through Philostratos son of Panes, an intermediary who may have held a contract to supply the wheat to the garrisons of the desert routes, and who engaged Nikanor's transport company to deliver it.⁷⁶ The precise details of the transaction are irrecoverable, and the document throws up many more questions than it answers, but one point is clear: civilians were engaged in the transport of military supplies, and this cannot be a private transaction, as public wheat is transported.⁷⁷ It must have been more convenient for the state, its officials or contractors, to engage civilian transporters, rather than organizing transport itself using requisitioned animals. It is likely that many civilians took advantage of the opportunities to provide transport services, and a possible example of this, again of first-century date, is an individual called Kametis son of Pachratos. In a receipt for a tax on donkeys and wagons, which must have been imposed on private transport, Kametis paid 150 drachmas in one year, a considerable sum suggesting that he owned numerous animals and vehicles.⁷⁸ Finally, a number of recently published ostraca from the *hydreuma* at Maximianon add to our picture. The documents from Maximianon not only provide proof that Quseir al-Qadim is the site of Myos Hormos, but also show that there was a regular supply caravan linking Koptos with Myos Hormos.⁷⁹

⁷⁶ If this is the case, his status, whether military or civilian is not clear, but he may be similar to the *conductores faenarii* (hay contractors) responsible for the supply of hay to a *turma* of the Ala Veterana Gallica, see *P. Lond.* II 482 = Fink, *RMR* 80 (AD 130?). Fink suggests that they are military personnel on the strength that the receipt is written in Latin, but it seems unsafe to suggest that, as *O. Petr.* 245 is in Greek, the opposite is the case.

⁷⁷ For more detail, see Adams, 'Supplying the Roman army: bureaucracy in Roman Egypt'. The army seems to have received its wheat from public granaries, see *BGU* I 81 (AD 189) and *P. Oxy.* XLV 3243 (AD 214/15).

⁷⁸ *WO* 392 (AD 47). See also *WO* 1180 for a list of charges for wagon hire, but details are lost.

⁷⁹ *O. Max.* 2 = *SB* XXII 15453 (second century), displaying the regular nature of connections between stations, and *O. Max.* 4 = *SB* XXII 15455 (second century) mentioning what must be a regular caravan. Regularity is also implied by *O. Did.* inv. 329, see A. Bülow-Jacobsen, 'Drinking and cheating in the desert', in T. Gagos and R. S. Bagnall (ed.), *Essays and Texts in Honor of J. David Thomas*, pp. 119–23.

Perhaps during the first century AD, when Roman state involvement in the Eastern Desert was not firmly established or on a large scale, it was not necessary to have formal arrangements for supply. However, in the second century, when trade was well established and the quarries were intensively exploited, more organized systems of supply were required and developed. We have seen that a regular caravan service supplied Mons Claudianus, and it seems clear from one papyrus dating to AD 163 that there was a state-organized supply system linking the various stations on the routes between the Nile Valley and the Red Sea port of Berenike.⁸⁰ We have seen that soldiers paid for their rations through deductions in their pay, and that this strongly suggests state involvement in supply. That there was an increase in this involvement over time is consistent with the move towards the supply of some rations free of charge, and the payment of soldiers in kind, which was eventually to become the *annona militaris*.

Perhaps our best evidence for military supply elsewhere in Egypt comes from a group of documents collected in the so-called archive of Damarion.⁸¹ These concern the collection of barley from the Hermopolite nome by the *duplicarius* Antonius Iustinus in AD 185 and 186 for the requirements of the *ala Heracliana* based in Koptos in the Thebaid. The amount of barley required from the nome was set by the prefect of Egypt, Longaeus Rufus. This total was split between the various villages of the nome, perhaps according to size, by the *strategos* Damarion, and was collected from the village *presbyteroi* by Antonius Iustinus, who issued receipts.⁸² Another document from the Fayum, of similar date, adds complexity.⁸³ It preserves a report addressed to a soldier (*decurio*) on quantities of wheat stored in granaries in a particular month, together with quantities despatched to the harbour of the Sacred Grove. That the

⁸⁰ *P. Lond.* II 328, p. 74: a camel declaration from Soknopiou Nesos stating that a camel had been requisitioned for service on a caravan plying the route from Koptos to Berenike: *εἰς κυριακὰς χρείας τῶν ἀπὸ Βερενείκης γενομένων πορευῶν*. The owner possessed another camel, requisitioned for work hauling porphyry.

⁸¹ See S. Daris, 'Le carte dello stratego Damarion', *Aegyptus* 72 (1992), 23–59, to which *P. Bodl.* I 14 should be added. See Mitthof, *Annona Militaris*, 314–17.

⁸² See especially *P. Amh.* II 107 = *W. Chr.* 417 (AD 185).

⁸³ *BGU* I 81 (AD 189) with *BL* I 16.

addressee is a soldier surely indicates that the wheat was destined for military supply. In this respect, it can be compared with a document from Oxyrhynchos, discussed above, where the prefect had ordered the distribution of grain which had been held in balance in granaries.⁸⁴ He ordered the *strategos* to report on the amount of grain remaining, ‘adding how much has already been allocated for the animals of the soldiers in the Thebaid and for the requirements of the men serving in the Porphyrite and Claudian quarries, as well as the usual local [provisions?]’.⁸⁵ Taken together, these documents suggest a central direction of military supply, which is not surprising given the origin of the grain as tax payments in kind.⁸⁶ The supply of fodder for animals used by the army is the subject of a number of other documents.⁸⁷ Fodder was sometimes transported long distances, challenging assumptions that there were operational limits for military units stationed or working some distance from the source of fodder. It was certainly not always the case that the army itself transported its own supplies, as it often fell on local populations to deliver fodder, as we shall see. Caravans and wagons were used to transport large quantities of supplies, and we should certainly be wary of adopting too restricted or rigid a view of the logistical capabilities of the Roman army, especially when it could draw on local resources and manpower to transport supplies.

These documents illustrate several features. First, supplies were collected and paid for often at locations far away from the units for which they were destined—in this case the Hermopolite nome and Koptos. Second, there seems to be no standard ‘system’ for organizing supply.⁸⁸ Third, that the whole transaction takes nearly

⁸⁴ *P. Oxy.* XLV 3243 (AD 214/15).

⁸⁵ What the ‘usual local [provisions?]’ were is not clear. It is possible that they were supplies set aside for soldiers based locally in the nome, perhaps on policing duties or on attachment to nome officials.

⁸⁶ Adams, ‘Supplying the Roman army: bureaucracy in Roman Egypt’.

⁸⁷ For example, *P. Hamb.* 39 = Fink 76 (AD 179); *P. Lond.* II 482, p. 42 = Fink 80 (AD 130).

⁸⁸ See *P. Grenf.* I 48 = *W. Chr.* 416 = Daris 55 (AD 191), a receipt issued to Didymos Argentius, a cavalryman of the *ala Veterana Gallica*, for barley he collected from the *presbyteroi* of Soknopaiou Nesos. Interestingly, he paid for the consignment himself. See *P. Köln* II 94 (AD 213) for a cavalryman receiving barley in the Oxyrhynchite nome destined for the Small Oasis.

2 years to complete shows either long-term planning or bureaucratic inefficiency—the latter seems more probable, and as we have seen throughout this study, is the reality of administration in Roman Egypt. Finally, although there is no mention of the onward transport of the barley from the Hermopolite nome to Koptos, we can be fairly sure that civilians were employed to transport it. It is to this that we must now turn.

There is little evidence, as we have seen, for how military supplies were transported from their point of origin to military units. We have some evidence for how this may have worked in the desert regions, but little or none of any precision for the Nile Valley. What seems clear from this evidence is that during the second century AD responsibility for the collection and transport of military supplies fell more and more on the local population as liturgies. In *P. Amh.* II 107, Antonius Iustinus may have been responsible for the collection of and payment for barley, but there is no mention of him organizing its onward transport to Koptos. It seems likely that he would have used existing networks used for the transport of tax-grain.

As the century progressed, there was an increasing tendency for *metropoleis* to elect individuals to perform specific obligations placed on the local population, anticipating third-century developments in the bureaucracy of Egypt. As early as AD 166, eligible individuals called *euschemones*, whom we have considered above, are further responsible for the conveyance of supplies and animals to the army.⁸⁹ A papyrus from Oxyrhynchos, dating to c.AD 179/180 is a petition lodged with the prefect of Egypt from a veteran cavalryman named Dionysius Amyntianus, and illustrates this point well.⁹⁰ On the orders of the previous prefect, and a *praefectus castrorum*, Dionysius had transported 775 blankets for the use of the soldiers of *legio II Traiana Fortis*. The blankets were probably made in Oxyrhynchos, which had a flourishing textile industry.⁹¹ Dionysius' problem is that the transfer of the blankets had been delayed, with the result that he and his companions were detained in Alexandria for

⁸⁹ Lewis, 'Εὐσχημόνες in Roman Egypt'.

⁹⁰ *P. Oxy.* XXXVI 2760.

⁹¹ P. van Minnen, 'The volume of the Oxyrhynchite textile trade', *MBAH* 5.2 (1986), 88–95.

over 40 days, and he was concerned that the sowing season was at hand. The fact that he is a landowner, discharged veteran, and had the necessary means to undertake this liturgy, strongly suggest that he was a *euschemon*.⁹² It seems that his responsibility was to ensure the safe transport and delivery of these supplies, and compares with later documents from Oxyrhynchos in which liturgists are appointed to ensure the transport of military supplies.⁹³

The best example of this is preserved in a notice relating to a special meeting of the town council of Oxyrhynchos:

The question of the transport of provisions for the most noble soldiers does not admit even a brief delay, and for this reason, and since letters from his excellency the dioicetes Aurelius Proteas, as well as from his excellency Ammonius, are urging us on this matter, and the boats to receive the supplies are already at anchor, it became necessary to summon a special meeting of the senate at a suitable place, in order that a discussion may be held on this single subject, and the obligations performed as quickly as possible. Accordingly in order that everyone, being informed of this, may willingly act as senator [?] today, which is the 15th, the letters are publicly exhibited. I thought it right that you should know by this proclamation that I have instructed you, being now in possession of the facts, to assemble swiftly in view of the orders, since no other subject remains for the present meeting, and to vote upon the elections of those who are to serve.⁹⁴

The typical wordiness of this document does not obscure the importance of the matter of military supply, and that it was a central concern of the state. Councillors were often connected with the collection of grain and its loading onto ships for onward transport.⁹⁵ But it is clear that they could often be required to accompany these consignments.⁹⁶ Appointees were also allocated the task of conveying animals

⁹² The liturgy may have been the *παράληψις δημοσίου ἵματιου*, attested in *P. Ryl.* II 189 (AD 128); see also *BGU VII* 1564 (AD 138) and 1572 = *Sel. Pap.* II 395 (AD 139). For a discussion of the supply of clothing to the army, see *P. Col.* IX pp. 81–8, and 137–46 for a list of relevant texts, with full reference to the *BL*.

⁹³ *P. Oxy.* XII 1412 (c. AD 284); XII 1414 (AD 270–5); and XII 1415 (late third century).

⁹⁴ *P. Oxy.* XII 1412 (trans. Hunt).

⁹⁵ *P. Lond.* III 948, p. 220; *P. Flor.* I 75; *W. Chr.* 434; *Stud. Pal.* I 34 in which ships' captains acknowledge receipt of corn from senators.

⁹⁶ Perhaps implied by *P. Oxy.* XII 1414 and 1415, but certainly the case in *P. Oxy.* LX 4063 (AD 183), and, for *πυρὸς συναγοραστικός*, *P. Oxy.* LX 4064–5 (both AD 183).

and other supplies to units, possibly based in Alexandria or Babylon.⁹⁷ The onerous nature of these duties is clear from several documents which record that there was either difficulty in appointing officials, or even that they had absconded.⁹⁸

CONCLUSIONS

In many respects, the methods used for transporting supplies to state operations in the Eastern Desert and to military units were very similar to those in place for the transport of tax-grain, the transfer of animals around the nomes of Egypt, and for the support of imperial campaigns outside Egypt, which we have already touched upon in an earlier chapter. The burdens placed on the local population were certainly similar and oppressive, and the overbearing and often ineffectual bureaucratic structures designed to facilitate such transport and supply likewise. They put additional pressure on transport resources already stretched to their limits, and thus must have had an impact not only on the commercial life of the province, but also the ability of landowners effectively to undertake transport on their estates, or, at least, their capacity to be completely flexible in their approach to it; it must also have robbed the pool of transport available to them. However, at the same time, opportunities must have been available for those not fully integrated into the agricultural economy, members of large families who owned a limited amount of land, or even those with little or no land, to supplement or even replace the incomes they could make from farming. It is to trade and the agricultural economy that we must now turn, in order to assess the impact of state demands for transport on the private individual, and what opportunities transport could bring to them.

⁹⁷ *P. Oxy.* XII 1414 (third century).

⁹⁸ *P. Oxy.* XII 1415 for the appointment of officials for the conveyance of military supplies, and replacements for those who had absconded. We should recall here *P. Oxy.* XVIII 2182 (AD 165), where donkey-drivers have absconded, and XIX 2118, where no animals are brought forward.

Trade and Transport

In the previous chapter, we considered the transport of supplies to the quarries and stations of the Eastern and Western Deserts and the military garrisons that manned them. In this chapter we turn to the role of transport in trade and commerce. The desert regions were important to trade, not only because it was necessary to life in these arid and marginal regions, but because the Eastern Desert was the conduit for luxury goods imported from the east into the Roman empire through Red Sea ports. It is not surprising, therefore, that this region has received the most scholarly attention.¹ It has certainly yielded the most interesting and potentially useful evidence, for documentary evidence can be compared with the rich archaeological record and this combination will hopefully provide a more complete picture than any single category alone. But we possess good evidence for trade in other regions of Egypt. Through a series of case studies, this chapter seeks to establish systems of transport and trade in a number of regions of Egypt. Through regional studies, we may be able to derive conclusions that are more generally valid to the role of trade and transport in the economy of Roman Egypt.

EASTERN DESERT

The Eastern Desert was crossed by a number of principal routes linking the main emporium on the Nile, Koptos, with Myos Hormos

¹ The bibliography is vast: see especially Sidebotham, *Roman Economic Policy* and more recently, Young, *Rome's Eastern Trade*. See also, W. Z. Wendrich, R. S. Tomber, S. E. Sidebotham, J. A. Harrell, R. T. G. Cappers, and R. S. Bagnall, 'Berenike crossroads: the integration of information', *JESHO* 46, 1 (2003), 46–87, with full bibliography.

and Berenike, the principal Red Sea ports in the Roman period.² Other routes linked the quarries of the region to Qena. There is little doubt that continuing survey and excavation in the region will add substantially to our knowledge of trade and transport. The evidence we possess at this point is substantial, but, as we would expect, leaves many questions unanswered.

Archive of Nikanor

This important archive, comprising some 88 ostraca, concerns the commercial activities of members of the family of Nikanor in the Eastern Desert, extending over a period of nearly 60 years (6 BC–AD 62).³ Nikanor and his family were camel-owners and drivers engaged in the transport of various commodities between Koptos in the Nile Valley, and the Red Sea ports of Myos Hormos and Berenike—the two important ports of that region in the Roman period.⁴ All of the ostraca were found at Koptos, suggesting that this was the operational base of the firm, and that it was here Nikanor received payment.⁵ This very fact, along with other internal evidence, suggests that the firm was engaged not in the trade of goods, but merely in

² On routes, see Chapter 2.

³ *O. Petr.* 220–304, with *O. Brüß. Berl.* 7 and *O. Bodl.* II 1969–71. For discussion, see M. Rostovtzeff, *Gnomon* 7 (1931), 23–6; A. Fuks, ‘Notes on the archive of Nikanor’, *JJP* 5 (1951), 207–16; Rostovtzeff, *SEHRE*, 577, n. 18; Rathbone, ‘Italian wines in Roman Egypt’, 82–90; Sidebotham, *Roman Economic Policy*, 83–92; K. Ruffing, ‘Das Nikanor-Archiv und der römische Süd- und Osthandel’, *MBAH* 12 (1993), 1–26; Adams, ‘Supplying the Roman army’; R. Alston, ‘Trade and the City in Roman Egypt’, in Parkins and Smith (ed.), *Trade, Traders and the Ancient City*, 168–202, esp. 179–80; and Young, *Rome’s Eastern Trade*, 64–5. For details on Nikanor’s family, see Fuks, ‘Notes’. For most of this period, Nikanor son of Panes was in control of the firm. His sons Peteharpochrates and Miresis are first attested in 34 and 41 respectively, and his brothers Philostratus and Apollon are also involved. An unrelated individual, Peteasmephis son of Herkles, may have been a partner.

⁴ On these ports see Sidebotham, *Roman Economic Policy*, s.v. Berenike and Myos Hormos, the latter now considered to be located at modern Quseir, see D. Peacock, ‘The site of Myos Hormos: a view from space’, *JRA* 6 (1993), 226–32, and Bülow-Jacobsen *et al.*, ‘The identification of Myos Hormos’. Up-to-date bibliography can be found in Young, *Rome’s Eastern Trade* and Wendrich *et al.*, ‘Berenike crossroads’. We look forward to a forthcoming book by Sidebotham and others setting some 10 years of survey into its historical perspective.

⁵ *O. Petr.* 245 was written at Apollonis Hydreuma on the route to Berenike.

their transport under contract. This is further suggested by the probable function of the documents. Each is a receipt issued to Nikanor or a member of his family for the transport of various commodities from Koptos to either Berenike or Myos Hormos. As all but one were written in Koptos, but relate to the accounts of merchants in the two ports, we can safely assume that these merchants had representatives in Koptos, presumably overseeing their interests there, and, as we shall see, given the scale of the trade, it is probable that they were permanent employees or agents. It is likely, therefore, that the receipts issued to Nikanor and members of his family served as proof of receipt of goods for transport, and payment would be received upon completion of the contract. On his return, Nikanor submitted the receipts in Koptos, showing that goods had been received at the ports, and his payment would follow.⁶

The ostraca in large part follow the same form: they are addressed to Nikanor or one of his transporters from the contractor, and contain details of where the consignment was received, the name of the account, the goods transported and their quantities, and finally the date. A diverse range of commodities was transported: mainly foodstuffs (wheat, barley, wine, bread, oil), but also chaff for animal feed, matting, pots, cloaks, drugs (presumably medicinal), animal skins, silver bullion and coin. Quantities are often small, although sometimes large quantities of wheat are delivered—in one case 132 artabas (some 22 camel loads). In another document, which certainly records a delivery of military supplies to Apollonos Hydreuma as we have seen, one of Nikanor's transporters, Kastor son of Eponychos, delivers 6 artabas of wheat to a soldier named Gaius Julius Longinus. This one load is part of a consignment of $35\frac{5}{6}$ loads to be delivered on the account of the month of Mesore (August). This not only suggests a caravan of some 36 camels (as each could carry 6 artabas), but also that Nikanor's firm may have held a contract to deliver supplies each month.⁷ Ultimately, there is not enough information to allow us to determine the size of Nikanor's transport firm, but given that his

⁶ This is almost certainly the case in *O. Petr.* 240 (AD 34), a receipt issued to Peteharpochrates son of Nikanor by Phnas son of Pamines, the representative of Marcus Laelius Hymenaeus in Koptos. Phnas issued 6 keramia of Aminaean wine for transport to Berenike. There is solid evidence for the regular use of agents in trade.

⁷ *O. Petr.* 245, with Adams, 'Supplying the Roman army'.

sons and a number of other unrelated animal-drivers are involved, it is not inconceivable that Nikanor could have owned this number of camels, or at least be in a position to hire additional animals.⁸ There is little doubt that there was a significant amount of work to be had, and that his was not the only such firm. Two ostraca, of contemporary date to the Nikanor archive, suggest that a man named Kametis owned a firm which possessed significant numbers of wagons and animals.⁹ In a unique papyrus, regarding the transport of large quantities of luxury items from Myos Hormos to Koptos, a camel-driver (*καμηλίτης*) receives part of a large consignment of goods for transport to Koptos—the size and value of the cargo suggest that many transporters and their animals would have been engaged in its transport.¹⁰

The ostraka provide important information on the merchants trading in the ports, and this challenges many of the principal tenets of Moses Finley's model of the ancient economy. A number of individuals or groups at the ports seem to have held accounts with Nikanor. These may have been agents of merchants or landowners that lived in the Nile Valley, or more probably, Alexandria. Particularly important for our purposes are the Roman citizens that are attested, and three in particular are interesting. First, four ostraca record deliveries made on account for the agents of Marcus Julius Alexander, the brother of Tiberius Julius Alexander, later prefect of Egypt.¹¹ These brothers were part of an extremely rich Jewish family from Alexandria, and members of the family held important administrative posts within Egypt; Tiberius Julius Alexander, the father, according to Josephus, held the office of

⁸ As we have seen, camel registration documents from Soknopaiou Nesos show that camel-owners could own considerable herds. The largest herd seems to belong to the family of Stotoetis, which owned 26 animals, see Jördens, 'Sozialstrukturen', 66, n. 138, and the discussion in Chapter 5. Given the potential profits in the transport of luxury goods in the Eastern Desert, it is not inconceivable that Nikanor's family could have owned more.

⁹ WO 392 and 395 (AD 44–5 and 45–6). Kametis pays 150 drachmas for wagon tax, indicating a large number of wagons.

¹⁰ *P. Vindob.* G 40822 = SB XVIII 13167 (second century), see below.

¹¹ *O. Petr.* 266 (AD 43); 267 (AD 43); 268 (AD 44); and 271 (AD 43/4). On Tiberius Julius Alexander, see E. Turner, 'Tiberius Julius Alexander', *JRA* 44 (1954), 54–64, and P. A. Brunt, 'The administrators of Roman Egypt', *JRS* 65 (1975), 143, reprinted in id., *Roman Imperial Themes* (Oxford, 1990), 247.

alabarch, which most scholars believe to be synonymous with *arabarch*, the official in charge of customs in the Eastern Desert.¹² Marcus' brother, Tiberius, was *epistrategos* of the Thebaid in AD 42, and so in charge of the Eastern Desert, and was later prefect of Egypt in the last years of Nero.¹³ It seems clear that they capitalized on their position, regional knowledge and wealth. The second individual to be of particular interest is one Dymas, an imperial slave, himself the slave of another imperial slave, Thytas.¹⁴ He received two consignments of barley and chaff; his status, and the fact that the receipts are countersigned by a centurion, suggest military supply.¹⁵ Finally, there is Tiberius Claudius Epaphroditus—probably a freedman of Claudius.¹⁶ Agents of prominent and wealthy Romans and imperial freedmen point to more than just men of middling status and wealth. Any argument that trade with the east could be carried out by men of limited means, as we shall see, cannot stand.

The important issue about which the ostraca in the archive are silent, but about which we would like to know the most, is the destination of the commodities he transported. In a major review of the ostraca, Rostovtzeff suggested that the goods were destined for trade with the east.¹⁷ This view was widely accepted until recently, when it has been argued that, rather than items of trade, the commodities transported by Nikanor were intended to provision the inhabitants of the Red Sea ports.¹⁸ It seems unnecessary to see Nikanor's operations in such black and white terms, and we must resist the temptation to assume that commodities considered staples were not destined for long-distance trade. The economy in which Nikanor's firm operated was more complex—trade took place alongside provisioning. Also, it seems from the *Periplus Maris Erythraei*

¹² Josephus, *AJ* 18. 159–60.

¹³ On this see Sidebotham, *Roman Economic Policy*, 84–5, and 102–3.

¹⁴ *O. Petr.* 280 and 285.

¹⁵ Imperial freedmen are often associated with military supply. In four ostraca, Nikanor makes deliveries to public granaries in Berenike (*O. Petr.* 280; 285; 288; and 292).

¹⁶ *O. Petr.* 290 (AD 62).

¹⁷ Rostovtzeff, *Gnomon* 7 (1931), 23–6.

¹⁸ Ruffing, 'Das Nikanor-Archiv', n. 3, followed by Young, *Rome's Eastern Trade*, 64–5. Ruffing argues that the evidence of the *Periplus Maris Erythraei* suggests that the items carried by Nikanor were not important items of trade, but rather were staple goods for supplies at the ports.

that nearly all of the commodities transported by Nikanor were exported from Egypt. The evidence clearly shows that grain and wine, especially the good quality Aminaeon and Laodicean wines, were important items of trade, but were also necessary to secure the goodwill of foreign merchants. The factors long held to limit the trade in goods in the Mediterranean region—similar climate, the same needs and surpluses—do not apply to Arabia and India. Where Nikanor is solely concerned with the transport of supplies, this is specifically noted, as he carried *ἐπιμηνία* (monthly provisions).¹⁹ It is also safe to assume that barley and chaff, probably used for animal fodder, were destined for local consumption at the ports.

The supply of the communities living at the Red Sea ports must have been a large and complex process. No doubt merchants and their agents could organize their own supplies through the channels that they had developed with Koptos and the Nile Valley. Soldiers based at the ports would have been supplied in the same way as those based at the Eastern Desert quarries and the stations on the routes traversing the desert. It can only be expected that, with the final publication of excavation reports from both Berenike and Myos Hormos, more information will come to light.²⁰ Previous work has hinted at the large scale of the operation; Ruffing has estimated that some 2000 camel loads per month would have been required to supply the population of Berenike alone.²¹

Ostraca from Berenike

The evidence of the Nikanor archive is augmented by recently published ostraca from excavations at Berenike. These documents

¹⁹ *O. Petr.* 227; 246. Such provisions are mentioned in *O. Ber.* I 4; 20; 43; 78. For discussion of these ostraca, see below. In a rather lacunose ostrakon from Maximianon, a station on the route to Myos Hormos, mention may be made of 'those who carry the food supply to Myos Hormos' (*O. Max.* 4 = *SB XXII* 15455 (second century): *qui cibaria ferunt in Mys Or(mum)*). There is a possibility in the text that donkey-drivers are mentioned, and there is no reason to doubt that donkeys were used for desert transport—they turn up often in the ostraca from Mons Claudianus.

²⁰ The most recent survey of work at Berenike is Sidebotham and Wendrich, 'Berenike: archaeological fieldwork at a Ptolemaic–Roman port'.

²¹ Ruffing, 'Das Nikanor-Archiv', 4–7.

were found in a Roman dump dating to the first century AD (of Julio-Claudian and Flavian date), and are therefore roughly contemporary with the Nikanor ostraca, indeed several mention individuals known from the Nikanor archive.²² The documents originated at the customs house at the port, and nearly all belong to groups of texts associated with certain individuals. All are orders to let pass at the customs station commodities belonging to individuals for reception by their agents. Unfortunately, no Nikanor, son of Panes, is mentioned, but we can imagine him receiving such treatment. Most of the goods were destined for trade with Arabia and India, for they are specifically stated to be for the 'outfitting' (ἐξαρτισιμός) of ships.²³ It is likely that the tax or duty charged on the goods was paid at Koptos, the point of departure from the Nile Valley, and the passes we possess from Berenike were issued in Koptos and handed in at the customs station.²⁴

The ostraca offer little information concerning individuals. Even the official titles or position of the customs-station officials issuing the receipts are absent. This is the nature of ostraca—they were ephemeral documents, not meant for permanent archives. So it is also with the transporters carrying the goods. The owner of the goods is stated in full, and in the majority of cases where an owner is mentioned, it is the imperial freedman Tiberius Claudius (Achilleus) Dorion.²⁵ The transporters of the goods are identified in each case—many have Egyptian names—but in each document

²² Note, for example, Gaius Julius Epaphroditus, the imperial freedman mentioned in *O. Petr.* 290, cf. *O. Ber.* I 80–5. Tiberius Claudius Dorion, cf. *O. Ber.* I 51–66, is no doubt also an imperial freedman.

²³ See the discussion of this unusual term at *O. Ber.* I, p. 8.

²⁴ As the editors point out, this must show that tax was paid on both import and export from the Roman empire. According to Strabo, the rate of tax for import and export was 25 per cent (Strabo 17. 1. 13, cf. *P. Customs*, p. 5). G. G. Thür, 'Hypotheken-Urkunde eines Seedarlehens für eine Reise nach Muziris und Apographie für die Tetarte in Alexandria (zu *P. Vindob.* G 40822)', *Tyche* 2 (1987), 229–45, argues that tax was only charged on imports. This can make no sense in the face of the Berenike ostraca which show that tax must have been paid on exports, although the rate is not stated. For a full discussion of taxes, see Sidebotham, *Roman Economic Policy*, 102–10, and *O. Ber.* I, pp. 8–11.

²⁵ The status and position of Tiberius Claudius Dorion are obscure. In *O. Ber.* I 50, a soldier named Heroninos is described as the soldier of Dorion, but there is no evidence that the latter was a military commander in the region; this proves little. If he was an imperial agent, and it is certainly possible on onomastic grounds, it is likely that he could employ the services of a soldier, either officially or unofficially.

only one individual is mentioned, even though the consignments in many cases are far too large for a single transporter to handle. We must infer that only the senior transporter was mentioned for each consignment. This is probably the case in the one example to offer more detail, where a camel-driver is styled 'Kallo(..) son of Haryothes, camel-driver of Machatas of the men of Antaios son of Apion'.²⁶ The consignment is a small one, possibly carried by one or two camels, easily controlled by a single driver, but if the reading of the text is correct, it seems possible that he was part of a larger group of transporters, possibly a transport firm like that of Nikanor.

The principal commodity transported was wine, but olive oil, monthly rations, onions and beets, vinegar and flat bread, and medicines and unguents also appear. A number of different wines appear (Italian, Laodicean, Rhodian, Aminaeon, Ephesian, Kolophonian, Sweet Rhodian (?) and perhaps local Egyptian wine in Laodicean containers), and some match the wines transported by Nikanor, although he tended to transport in smaller quantities than appear in the Berenike documents. It has been the small size of loads carried across the desert that has tempted scholars to suggest they are provisions rather than items of trade. But it would have been natural, given the limitations of weight and bulk which could be carried by pack animals, that even substantial consignments would be broken down into animal loads. The loads carried by camels, therefore, cannot be held to represent the full cargo of any ship, or indeed the full consignment of any merchant.²⁷ It is likely that ships would be loaded according to the arrival of caravans, so we can gain no clear picture of the size of the cargoes being shipped.

If we compare this to the evidence of the *Periplus Maris Erythraei*, we note that just such commodities had markets in Arabia and India.²⁸ But one interesting feature of the *Periplus* which has not

²⁶ *O. Ber.* I 87.

²⁷ See *O. Ber.* I, p. 16.

²⁸ The definitive text is Casson, *The Periplus Maris Erythraei*, with id., 'Rome's trade with the East: the sea voyage from Africa to India', *TAPA* 110 (1980), 21–36; id., 'Egypt, Africa and India: patterns of seaborne trade in the first century AD', *BASP* 21 (1984), 39–47. See also V. Begley and R. de Puma (ed.), *Rome and India: The Ancient Sea Trade* (Madison, 1991); F. de Romanis, *Cassia, Cinnamomo, Ossidiana: Uomini e merci tra oceano Indiano e Mediterraneo* (Rome, 1996); id. and A. Tchernia (ed.), *Crossings: Early Mediterranean Contacts with India* (New Delhi, 1997).

been discussed is the apparent pattern of trade—the practice of coasting. It seems clear from the Berenike ostraca that the cargoes of ships were made up of small consignments of the accounts of various merchants or other individuals. Certainly, there were principal ports of trade, but we also read of ‘some ships sailing principally to these ports of trade, but some follow the coast and take on whatever cargoes come their way’, no doubt looking for the best price for their goods in the various markets.²⁹ While merchants travelling from Roman Egypt could afford to export a selection of staple goods, finer wines, and some more luxurious items such as linens and other fabrics, it is clear that their cargoes on the return journey consisted mostly of luxuries, although rather more prosaic goods such as pottery and beads are also attested.³⁰ While it is likely that good prices must have been obtainable for such commodities as wine in the ports of the east (one individual’s staple may be another’s luxury), it is also clear that Roman money and silver bullion were exported.³¹ It is certain that staple commodities were traded in the ports of the east, and perhaps even formed the bulk of ships’ cargoes, but it is reasonable to assume that it was bullion and coin which was exchanged in large part for the extremely valuable items destined for import into Egypt.

The scale and value of imports into Egypt was great, until recently evidenced only by the comments of Pliny the Elder (*NH* 6. 101)—a

²⁹ *Periplus Maris Erythraei* 14 (trans. Casson).

³⁰ Perhaps this is how we should understand the seemingly careless remark of Pliny the Elder (*NH* 6. 101), that in any year India absorbed 50 million sesterces of Rome’s wealth, while goods imported from India were sold at 100 times their value.

³¹ *O. Petr.* 290 for silver bullion and money. See most importantly C. Rodewald, *Money in the Age of Tiberius* (Manchester, 1976), with useful discussion in M. Rashke, ‘New studies in Roman commerce with the east’, *ANRW* ii. 9.2 (Berlin, 1978), *passim*, and Sidebotham, *Roman Economic Policy*, 18–19. For more detail, see A. V. Walser, ‘Zur Rolle des Geldes im Handel zwischen dem Imperium Romanum, Südarabien und Indien in der frühen Kaiserzeit’, *MBAH* 20 (2002), 81–107, but his argument that barter was the principal form of exchange, and that even money was bartered, seems tenuous if extended to the whole region. Traders visiting the port of Muza, for example, are advised to bring considerable quantities of money (*PME* 28. 8); this may suggest barter, but equally that money was the principal form of exchange at Muza, or that it was simply expensive. *P. Giss.* II 47 = *W. Chr.* 326 (AD 117) (with *BL Konkordanz* 76) mentions the price of silver bullion in Koptos, at 362 drachmas, but that the price fluctuates daily.

much discussed passage.³² But some weight has been given to Pliny's estimates, even if not fully allaying the suspicion of exaggeration, by a unique papyrus published in 1985.³³ The recto preserves details of a contract concerning the transport of luxury goods from either Myos Hormos or Berenike to Koptos, and thence downriver to Alexandria. Also mentioned is a loan, which one party took out from another, seemingly to cover the cost of the commodities purchased in the port of Muziris in India. The verso preserves an account of quantities of luxury goods (Gangetic nard, ivory, textiles) and their value. It is likely that both recto and verso concern the same shipment. Unfortunately, the first lines of the papyrus are missing, so we have lost potentially very important details, including the names of the parties to the loan. But this document does not detail the loan (although we certainly can get a sense of its provisions), rather it seems it was drawn up at the port after the arrival of the cargo, and may be a supplementary agreement.³⁴ The contents of the cargo are detailed according to their weight and value and, presumably, apportioned to the camel-drivers for transport.

The importance of the document lies in the information it preserves on the value of the cargo. Six parcels were carried on a ship named the *Hermapollon* with a total value of almost 1155 talents, almost HS 7 million.³⁵ We do not know the full details of the cargo, but what we have record of are 60 containers of Gangetic nard (with a value of 45 talents), just over 78 talents-weight of ivory, and

³² See Raschke, 'New studies in Roman commerce with the east', 634–7.

³³ *P. Vindob.* G 40822 = *SB XVIII* 13167 (second century), see H. Harrauer and P. J. Sijpesteijn, 'Ein neues dokument zu Roms Indienhandel', *P. Vindob.* G 40822', *Anzeiger der Österreichischen Akademie der Wissenschaften, phil. -hist. Kl.* 122 (1985), 124–55; L. Casson, 'P. Vindob. G 40822 and the shipping of goods from India', *BASP* 23 (1986), 73–9; Thür, 'Hypotheken-Urkunde'; id. 'Zum Seerdarlehen κατὰ Μουζείρων', *P. Vindob.* G 40822', *Tyche* 3 (1988), 229–33; L. Casson, 'New light on maritime loans: P. Vindob. G 40822', *ZPE* 84 (1990), 195–206; F. de Romanis, 'Commercio, metrologia, fiscalità su P. Vindob. G 40822 verso', *MEFRA* 110 (1998), 11–60, with some important textual corrections; D. Rathbone, 'The "Muziris" papyrus (*SB XVIII* 13167): financing Roman trade with India', *BSAA* 46 (2000), 39–50. The text is discussed inadequately by Young, *Rome's Eastern Trade*, 55–8.

³⁴ So Casson, 'New light on maritime loans', 205.

³⁵ Casson provides context for this sum by comparison with the 7 million drachmas spent on the construction of an aqueduct at Alexandria Troas in the reign of Hadrian (Philostratus, *VS* 2. 1 [548]).

a little over 12 talents-weight of fabric (both worth 528 775 drachmas). On the basis of information derived from Pliny and Strabo about the value and volume of trade, Rathbone has estimated that annual purchases made in India and Arabia may have amounted to about HS 90 million, and that annual sales in Rome and the empire could therefore have reached c.HS 1400 million.³⁶ This represented a considerable amount when compared to Hopkin's estimate of the GDP of the empire of around HS 9000 million.³⁷ These rough estimates, fully credible or not, at least indicate the potential value of the eastern trade, and must indicate its importance in terms of value to the economy of the Roman empire. It is unlikely, however, that trade at this level of intensity took place every year, and these figures must represent a maximum potential rather than a realistic picture of a constant state.³⁸ At any rate, trade on this scale cannot be considered peripheral, and surely was the preserve of the exceptionally wealthy. However, we must be careful not to exaggerate its importance as a constant factor.

Unfortunately no details are preserved about the camel-drivers and their caravans, but the scale and value of the cargoes imported into Egypt shows that transporters formed a potentially important economic group in the region. As we have seen, the cargo detailed in the Vienna papyrus was large; we do not have detail about the size or weight of the containers of Gangetic nard, but the ivory and fabric weighed a total of about 92 talents, or 8692 lbs. On the basis of weight alone, a caravan of between 15 and 20 camels would be

³⁶ Pliny, *NH* 6. 101; Strabo 2. 5. 12 and 17. 1. 13. Rathbone, 'The "Muziris" Papyrus', 48–9.

³⁷ Hopkins, 'Rome, taxes, rents and trade', in Scheidel and Von Reden, esp. 197–9. This is based on an estimate of the total population of the empire, multiplied by the minimum requirements for subsistence in grain and the amount needed for the next annual crop.

³⁸ See the comments of C. R. Whittaker, *Rome and its Frontiers: The Dynamics of Empire* (London and New York, 2004), 171, who suggests that there may have been an initial surge of interest at the beginning of the Roman period, but we have noted Strabo's comments on the increase of trade under Augustus, while the Muziris papyrus dates to the reign of Hadrian. We should also remember that Pliny does say 'every year', and he is writing in the period between Augustus and Hadrian, which suggests some continuity at least. Whittaker believes that the scale of trade was much smaller than the text suggests, and that there were few investors. This is not fully borne out by our evidence.

required, but of course the number would depend on the strength and size of animals, the awkwardness and size of the load or containers carried, and the distance travelled each day (although the Eastern Desert routes were well supplied with resting stations). But this is only part of the ship's cargo, and it would not be unreasonable to find larger caravans.³⁹ We must also remember that this represents the cargo of one ship—the cargoes of 120 would require a large number of animals and transporters. The caravans crossing the desert, therefore, were large, were probably accompanied by merchants and their agents, and were presumably guarded by soldiers (in addition to those stationed at the resting points on the desert routes).

Unfortunately, there is no evidence in the document for the transport rates charged by the camel-owners—indeed, despite the amount of evidence for transport in the papyri generally there is very little information about the cost of transport—typically it is the one aspect of transport about which we would want to know the most. It may be possible, with some speculation, to establish a notion of scale. Our starting point is the cost of animal hire, which was about 4 drachmas per day in the mid-second century.⁴⁰ The journey from Berenike to Koptos was 12 days, so each camel would have cost a minimum of 48 drachmas for the period of work. We have one papyrus in which a rate for the transport of alum in the Western Desert is recorded and may bear comparison.⁴¹ Each talent-weight carried was charged at a rate of 7 drachmas 3 obols, and on the basis that a camel would carry perhaps 6 talents in weight, would mean a charge of 45 drachmas per camel for transport. The respective sums do not seem disproportionate, as we would expect a charge for transport to be slightly higher than hire. We should consider these charges, however, to be very much at the lower end of our estimate. In respect of the transport of luxury items from the east, we could safely assume there to have been some form of index link to the value

³⁹ See *P. Oxy.* XXXI 2766 (AD 305) for a caravan of c.75 camels in the Western Desert. In later periods, caravans of up to 500 camels are attested, see Goitein, *Mediterranean Society* i, 276.

⁴⁰ *BGU* III 921 (*BL* I 84) (second century). Various rates are recorded, 4 drachmas being the highest. The rate may have depended on the character of work undertaken.

⁴¹ *BGU* III 697 = *Sel. Pap.* II 370 (AD 145).

of goods transported. If our suggestion that Nikanor's transport firm possessed around 30 camels, his estimated minimum fee for transporting consignments from cargoes such as that described in the Vienna papyrus (reign of Hadrian) could be in the region of 1350 drachmas. When added to contracts for delivering goods to the ports and for transporting military supplies, and considering that many ships were landing at the ports and providing opportunity for business, Nikanor was doing well.

While Nikanor and his family firm cannot have been alone, and there were no doubt many similar transporters, it is clear that his role was significant. If the above suggestions are correct, and he owned a substantial herd of camels, then he was a man of some means—camels were valuable animals. He held contracts for transport with wealthy and influential Romans and provincial notables, as well as with the Roman state. If trade was not peripheral, neither were transporters. Rather, these were players of some importance in the region.⁴² This is demonstrated by an inscription from the temple of Medamoud, in which two women, Aelia Isidora and Aelia Olympias are described as 'distinguished matrons, *naukleroi*, and merchants of the Red Sea'.⁴³ Unlike Nikanor, these individuals were engaged in both trade and transport (although the absence of evidence of Nikanor's involvement in trade in the ostraca does not mean that he was not). Rich citizens in Alexandria and the *metropoleis* of Egypt were no doubt similarly involved.

The scale and value of trade in the Eastern-Desert region was enough to attract the interest of the wealthiest Roman families. Marcus Julius Alexander, we have seen, had agents in the Red Sea ports, as did a number of other Romans. Graffiti from the Eastern Desert preserve the names of Romans travelling through, perhaps with caravans. P. Annius Plocamus, linked to the family of the Annii from Puteoli, is mentioned in a graffito on the Koptos–Berenike

⁴² It is probably inappropriate to compare Nikanor and his peers with the caravan-owners of Palmyra, but this is only on cultural grounds and because of our reluctance to ascribe to merchants or transporters in the Roman world any status, given the social prejudices of our sources and the value placed on them by historians such as Finley. Whether these prejudices have any basis in reality is moot.

⁴³ SB V 7539 = SEG VIII 703: *ματρῶναι στολάται ναύκληροι κα[ὶ] [ἐμπο]ροι ἐρυθραϊκαί.*

road, as is a C. Peticius at Wadi Hammamat, on the road between Koptos and Myos Hormos.⁴⁴ The family of the Annii held a tax-farming contract for the Red Sea in the early first century AD, and, no doubt, were able to use their contacts and knowledge of the region in order to trade—just as the family of Marcus Julius Alexander was to do later. C. Peticius was a member of a family which seems to have been heavily involved in trade. His name is inscribed on an amphora fragment found in Carthage, and more importantly, his family may be represented on a commemorative inscription found near the family's home in Apulia, on which five toga-clad figures stand below a heavily laden camel.⁴⁵ Within the papyri from the Nile Valley and Fayum, there is limited evidence for individuals engaged in the Red Sea trade.⁴⁶ There may be a hint in the form of individuals styled as 'the Indian', but there may be other explanations for naming practices. More promising is a late-first-century poll-tax register from Arsinoe, which states that an individual is 'in India'.⁴⁷ It is quite likely that this person was an agent working for a wealthy merchant in one of the Indian ports.

Imperial involvement in trade certainly cannot be ruled out.⁴⁸ We have seen evidence for imperial agents working in the Red Sea ports in the Nikanor archive. It is not clear, so Young argues, whether the imperial freedmen were directly involved in trade—they could equally be responsible for supplying the troops based in the region,

⁴⁴ On P. Annii Plocamus, see D. Meredith, 'Annius Plocamus: two inscriptions from the Berenice road', *JRS* 43 (1953), 38–40. His family also held a tax-farming contract in the Red Sea region according to Pliny the Elder (*NH* 6. 24. 84–5), see Sidebotham, *Roman Economic Policy*, 32–3. On C. Peticius, see *I. Koss*. 120 and 121. *SB* III 7169, dated to c.200–150 BC, records an early trading venture to Africa. The traders are Greek Egyptians, but investors include traders from Marseilles and a man from Veii in Italy.

⁴⁵ *CIL*VIII 22640, 65; A. Tchernia, 'Le dromadaire des Peticii', *MEFRA* 104 (1992), 293–301.

⁴⁶ M. Raschke, 'Papyrological evidence for Ptolemaic and Roman trade with India', *Proceedings of the XIV International Congress of Papyrologists* (London, 1975), 241–6.

⁴⁷ *P. Lond.* II 260 ll. 41–2 (pp. 42–53) = *Stud. Pal.* I p. 74 (AD 72–3).

⁴⁸ Discussed briefly by Young, *Rome's Eastern Trade*, 61, citing Sidebotham, *Roman Economic Policy*, 48–68 and 113–74. Young's analysis of Sidebotham's suggestions is hardly penetrating or convincing.

or perhaps be involved in the supervision of taxes. But there was a massive imperial investment in the Eastern Desert—in quarries, roads and stations, and in military activity: this cannot only be explained by the state's interest in taxation. A British Museum papyrus certainly does suggest direct imperial involvement in trade. In this document, a camel registration from Soknopaiou Nesos, the owner declares two camels and a foal, and further that one of the animals had been requisitioned for imperial service on the caravans that travel from Berenike.⁴⁹ Only the state could requisition animals, so this is clear indication of regular state caravans to the Red Sea ports. There is evidence that the state used private transporters to carry supplies for the army, so we cannot simply suggest that this caravan did likewise—the situation is more complex. Given the profits that could be made in trade, it is not unlikely that there was an imperial interest.

An analysis of the economy of the Eastern Desert is beyond our scope here, but it is clear that it was dynamic and complex, as well as extremely valuable. The region was rich in resources and was a doorway to trade with the east. The Red Sea ports, and the goods imported into them demanded protection, as did Roman interests in the important quarries of the region. So trading interests and commercial interests in the region encouraged the development of an infrastructure of roads and stations, and a significant military presence to protect it. The presence of the military, in turn, encouraged local trade, as soldiers had disposable income. Evidence from Mons Claudianus has shown that the soldiers and workers there lived a life of reasonable luxury (indeed drinking many of the same wines that were exported to the east). So this was a symbiotic regional economy—trade and commercial activity leading to state involvement and support, which in turn led to further trading activity.⁵⁰

⁴⁹ *P. Lond.* II 328 (p. 74) (AD 163): εἰς κυριακὰς χρείας τῶν ἀπὸ Βερνείκης γεινο(μένων) πορ[ε]ϊῶν.

⁵⁰ For the army as a stimulus for long distance trade, see P. Middleton, 'The Roman army and long distance trade', in P. Garnsey and C. R. Whittaker (ed.), *Trade and Famine in Classical Antiquity* (Cambridge, 1983), 75–83.

WESTERN DESERT

There is much less evidence for trade in the Western Desert, but there is little doubt that it was a regular feature.⁵¹ Routes connected the oases with the Nile Valley (principally at Oxyrhynchos) and the Fayum. Routes also existed between the oases.⁵² Communication with the Nile Valley was important to the military units based in the oases, and it is clear that they received supplies from there in considerable quantities. No doubt the presence of soldiers further encouraged trade, as it did in the Eastern Desert. But the Western Desert was different: the oases were well populated and highly fertile, important producers of such commodities as wine, dates, and olive oil.⁵³ These products were exported to the Nile Valley, but importantly the land economy of the oases could not support its population, so much was imported from the valley and Fayum. The majority of evidence for trade with the oases is preserved in the form of customs receipts, which we will turn to in the next section. First we must consider evidence for trade between Oxyrhynchos and the oases themselves. This is largely contained in private letters or contracts, a body of evidence so far neglected in the study of the economy of Egypt.

Several documents demonstrate close links between Oxyrhynchos and the western oases. The earliest is a customs receipt, probably issued in the Small Oasis, for payment of the 1 per cent tax on a donkey load of barley and garlic.⁵⁴ Higher market value in

⁵¹ The basic work on the Western Desert remains Wagner, *Les oasis d'Égypte*. Recent work at Kellis will no doubt reveal more information.

⁵² On the routes, see A. Fakhry, *The Oases of Egypt* i, *Siwa Oasis* (Cairo, 1973), 14–15; id., *The Oases of Egypt* ii, *Bahria and Farafra Oasis* (Cairo, 1974), 22–6; and Wagner, *Les oasis d'Égypte*, 140–54.

⁵³ See Wagner, *Les oasis d'Égypte*, 284–301. Strabo notes the abundance of Oasiatic wine at 17. 1. 42. The import of wine from the Small Oasis into Oxyrhynchos is attested in *P. Oxy.* XLVIII 3425 (AD 359–65).

⁵⁴ *P. Oxy.* XII 1439 = *P. Customs* 8 (AD 70)—the text does not record whether the goods were exported from the oasis, but on balance this seems likely, as the papyrus was found in Oxyrhynchos. On the production of garlic, see D. Crawford, 'Garlic-growing and agricultural specialisation in Graeco-Roman Egypt', *CdÉ* 48 (1973), 350–63.

Oxyrhynchos must be the stimulus for such transport.⁵⁵ That caravans of some size travelled between Oxyrhynchos and the oases is shown by another document, which records the transport of 300 artabas of wheat and 150 artabas of barley.⁵⁶ On the basis that the 'normal' load for a camel over such distances was 6 artabas, the caravan must have comprised some 75 animals. There is only one reference in the papyri to the *πορεία*, similar to the caravans that plied the Eastern Desert routes.⁵⁷ However, we can be sure that there was regular traffic of this nature, even if it did not carry with it the terminology of the Eastern Desert traffic. In one papyrus, a caravan made up of 12 animals is documented.⁵⁸ The state required transport for alum, a mineral on which it owned a monopoly. There is limited evidence, but caravans of animals are recorded transporting it, presumably under contracts similar to those for military supplies.⁵⁹ In this document from Soknopaiou Nesos, a *καμηλοτρόφος* named Panouphis son of Tesenouphis and Stotoetis, has transported 30 'light talents' (12 normal talents) of alum from the Small Oasis to Arsinoe, where it was received by the overseers of the monopoly (*ἐπιτηρηταί*). He received payment through the bank of Sabinus for his expenses for duty (at the rate of 1 drachma 3 obols per talent, giving 45 drachmas) and his transport fee (at 7 drachma 3 obols per talent, giving 90 drachmas).⁶⁰

It is certainly the case here that we are dealing with specialized transporters, and this is probably how we should understand two recently discovered papyri from Kellis in the Great Oasis concerning

⁵⁵ Possibly the case also in *SB XVI 12495 = PSI VII 798* (first century), with J. R. Rea, '*PSI VIII 798*', in R. Pintaudi (ed.), *Miscellanea Papyrologica* (Florence, 1980), 321–6. The search for better prices in markets is demonstrated by documents in the archive of Athenodoros, discussed below.

⁵⁶ *P. Oxy.* XXXI 2766 (AD 305).

⁵⁷ *PUG I 20* (AD 319).

⁵⁸ *SB XII 10912 = P. Customs 294*, exporting wheat from the oasis to Soknopaiou Nesos (AD 183 or 215).

⁵⁹ *BGU III 697 = W. Chr. 321 = Sel. Pap. II 370* (AD 145). Other evidence for alum: *P. Col.* VIII 228 (AD 205–6); *P. Oxy.* XVII 2116 (AD 229); *P. Oxy.* XXXI 2567 (AD 253); *P. Oxy.* XII 1429 (AD 300).

⁶⁰ Duty was not payable on goods transported on behalf of the state, see *Dig. XXXIX 4. 9. 7–8* [Paulus] and *Dig. XLIX 14. 6. 1* [Ulpian]. This was almost certainly the case in the Ptolemaic period, see *P. Customs* p. 3, citing *P. Lug. Bat.* XX 61 and *P. Hib.* II 198.

a camel-driver named Aurelius Horos son of Mersis.⁶¹ These are receipts for camel and donkey loads of produce made out by residents of the city of Hermopolis—it is possible that Horos was transporting produce between various parcels of land owned by those who contracted him. The transport of produce between estates is a matter to which we will return.

There is other evidence for transport and communication in the Western Desert. Two private letters from Oxyrhynchos and an associated document acknowledging the return of a deposit provide evidence for a circle of individuals engaged in transport and possibly trade.⁶² Given that the oases were linked administratively to the Oxyrhynchite nome, it would not be surprising to find Oxyrhynchite citizens owning land in the oases.⁶³ Financial matters and trade are the subject of the first letter, where Harpalus writes to his brother Heras saying that he has received a consignment of fish-paste, and had paid the river and land freightage. Other details are recorded: the receipt of wine from Herakleides (possibly an agent who travelled between the oases), trade of animal skins, the receipt of a letter of credit, an 'account' in the Great Oasis administered by Herakleides, and the possibility that a camel owned by Herakleides had been held in reserve, unnecessarily as it turned out, to cover expenses. The second letter indicates regular communication, while the acknowledgment of the receipt of a deposit on a loan suggests regular financial

⁶¹ *P. Kell.* Gr. 51–2 (AD 320). That Horos was a professional transporter may be further supported by his purchase of a share in a foal (most likely a camel) in *P. Kell.* Gr. 34 (AD 315) and ownership of a camel stall, see *P. Kell.* I Gr. 38a (AD 333). We thus have a small chapter of personal history, where we can imagine Horos building up his capital from humble beginnings to the ownership of a number of animals and premises in which to stable them. The journey between the oasis and Hermopolis was some 300 km.

⁶² *P. Oxy.* XLI 2983–4 (late second/early third century), and *P. Oxy.* XLI 2975 (AD 198).

⁶³ On administrative links between the Small Oasis and the Oxyrhynchite nome, see N. Lewis, 'Four Cornell papyri', *Recherches de Papyrologie* 3 (Paris, 1964), 27–30, esp. text 2, with *P. Merton* III 106. The Great Oasis was similarly linked to the Heptanomia, see D. Hagedorn, 'Quittung eines Reiters über den Empfang von Gerste (*P. Colon.* Inv. 245)', *ZPE* 1 (1967), 132–44, with *P. Amh.* II 137 (AD 289). A good example of such a landowner is Claudia Isidora alias Apia, see *P. Oxy.* XIV 1630 (AD 222), with Rowlandson, *Landowners and Tenants*, 114.

transactions between the various parties. What we have here is a snapshot of trading and financial dealing of some complexity.

The main evidence for trade and transport is preserved in a papyrus dating to AD 319.⁶⁴ It might represent a contract of partnership for the transportation of goods, by which the two parties have bought pack animals which will be used as working capital, to be deducted from the profits made from a trading venture. A more likely interpretation is that the partnership is formed in order to purchase goods for resale in the Oasis, as there is no mention of capital apart from the purchase of goods, and the purchase of animals is nowhere mentioned. What seems likely is that one partner provides the capital to purchase the goods for trade, while the other provides the transport animals. The nature of the trading venture is not clear, nor is that of the commodities purchased, but the text states that both parties will bear the cost of transport charges 'up to Egypt and to the Oasis',⁶⁵ Gofas suggests that the goods may come from one of the Red Sea ports, as the phrase 'up to Egypt' is often used to describe the journey from the desert to the Nile Valley. Equally, however, it may relate to goods coming into Egypt from Alexandria (always considered separate from the *chora*). The nature of the document, indeed of private letters and contracts generally, makes it extremely difficult to establish the precise details of the arrangement. However, it is certainly possible that we are dealing with individuals to whom trade was not novel, and perhaps in one case, a professional transporter.

Other more fragmentary evidence for trade in the oases survives: a second or third-century papyrus records the visit of a citizen of Apollonopolis Heptakomia to the Great Oasis for the purposes of

⁶⁴ PUG I 20, with PUG II Appendix I. The text was re-edited by Wagner, *Les oasis d'Égypte*, 327–8. Wagner does not take into account the new edition in PUG II, nor the remarks and re-edition of D. Gofas, 'Quelques observations sur un papyrus contenant un contrat de société (PUG II, Appendice I)', in F. Pastori (ed.), *Studi in onore di Arnaldo Biscardi* (Milan, 1982), 499–505. See now, id., 'Further remarks on PUG II, Appendix I (= PUG I 20)', *Proceedings of the XIXth International Congress of Papyrology Cairo*, 2–9 September 1989 i (Cairo, 1992), 341–51. See also, M. Amelotti and L. Migliardi, 'Una società di trasporto nella Grande Oasi', *Studi in memoria di Luca de Regibus* (Genoa, 1969), 167–96.

⁶⁵ PUG I 20 ll. 9–10: ἄχρι Αἰγύπτου καὶ εἰς Ὀασις.

commercial negotiations, and a minor document from Oxyrhynchos preserves a receipt for transport charges given by one Gaius Iulius Anthropas, the agent of Ulpius Mygdonius, to Sarapion alias Apollonios son of Spartas. The latter is described as an ex-gymnasiarch and formerly the surveyor of the Oasis of the Heptanomia(?).⁶⁶

Fayum (Arsinoite nome)

By far our best evidence for trade and transport in Egypt comes from a large body of customs receipts, almost all of which come from the Fayum. On one level this throws up a problem of typicality—how far is this evidence applicable to Egypt as a whole? On another, it presents good evidence for the role of trade in a regional economy. An analysis of this economy is beyond our scope, but the documents preserve valuable information about transport and transporters, although typically they do not preserve the information we would like about the status of the transporters—whether they worked as specialists under contract or were engaged in trade themselves—the ownership of animals, and other matters. However, much can be inferred with some degree of confidence.

The receipts are preserved individually in about 300 cases, and in some 16 customs registers, in all amounting to nearly 1000 receipts.⁶⁷ They are largely the same in form and content: a formula stating that taxes had been paid through a customs house, the name of the village where the duty was paid, the form of duty paid, the name of the transporter, whether the goods were imported or exported, the type of animals on which the goods were transported, the products transported, and the date.⁶⁸ The earliest receipt dates to March AD 18,

⁶⁶ *P. Giss.* I 9 (second or third century): ἐμπορίας χάριν. *P. Oxy.* XXXVI 2793 (second or third century).

⁶⁷ Customs receipts published before 1987 are collected and analysed in *P. Customs*. Details of receipts published subsequently are available at *P. Louvre* I pp. 138–9 (with *SB* XXII 15758 and XXII 15813), to which should be added *P. Louvre* I 27–9, *O. Eleph. Wagner* 55, and Adams and Gonis, ‘Two customs-house receipts’. It is possible that *P. Hawara* 208 (AD 24/5) is a customs register, although it does not conform in type, see P. van Minnen, ‘*P. Hawara* 208 revised’, *ZPE* 93 (1992), 205–8. See also *P. Oxy.* LXIX 4740–4.

⁶⁸ See further, *P. Customs* pp. 8–15. There are of course variations, perhaps the most notable being the inclusion of details on import and export, which became common after AD 114, and must reflect changes in practice perhaps linked to administrative reforms of the emperor Trajan.

the latest to AD 214, although it is likely that taxes continued to be collected.⁶⁹ That there are no later receipts may be put down to the decline of the villages on the fringes of the Fayum in the late third century. The customs registers are slightly different in nature, covering different periods of time, from 5 days to 6 months. There is no specific evidence as to their purpose, but they must have been drawn together for inspection by state officials, probably the *strategoï* of the nomes in which the customs houses lay. It is likely that the individual receipts were the original documents, and that the information they recorded was set down in the registers, which were probably of a less ephemeral nature.

Nearly all of the documents come from the villages lying on the fringes of the Fayum, and the majority of these from Soknopaiou Nesos. This geographical bunching does offer problems of interpretation, but is understandable in the sense that we would expect customs duties to be collected at the boundaries of tax regions. More worrying is the preponderance of Soknopaiou Nesos, but in some ways this is illusory, as the registers hail from there and account for the majority of receipts.⁷⁰ This village did lie at the terminus of a desert route, but just because we possess more evidence for the village does not necessarily show that it was more important to trade than any other, or that the route through it was more heavily used. But all of the evidence for this village, taken together, does suggest that its economy, rather than being based on agriculture, was founded upon other economic endeavours.⁷¹

⁶⁹ The latest receipt to bear an imperial title is *P. Grenf.* II 50(e) (AD 175), but evidence from seals and regnal years, where they can be identified and allocated with certainty, confirm dates to AD 214. See *P. Customs* pp. 71–4; on seals see K. Vandorpe, *Breaking the Seal of Secrecy: Sealing Practices in Greco-Roman and Byzantine Egypt based on Greek, Demotic and Latin Papyrological Evidence* (Leiden, 1995) and ead., 'Seals in and on the papyri of Egypt', *BCH Supp.* 29 (1997), 253.

⁷⁰ On the archaeological context of the finds, see Boak, *Soknopaiou Nesos*.

⁷¹ See Hobson, 'Agricultural land and economic life'. The failure of the village to engage with agriculture is the likely reason for its decline in the late third century AD, as it increasingly could not meet the tax requirements of the state. The decline of Soknopaiou Nesos, then, has a serious effect on the evidence of customs-house receipts, and must explain the absence of receipts later than the late third century. A wholly inadequate and incomplete survey of Soknopaiou Nesos is Leone, *Soknopaiou Nesos*, which even fails to cite Hobson's fundamental articles.

There is evidence for customs houses in the following Fayum villages: Soknopaiou Nesos, Karanis, Bakkhias, Philadelphia, Tebtunis, Dionysias, Philopator alias Theagenes, Kaine, and Anubias. It is clear that those villages lying in the west of the region served the routes connecting the Fayum with the oases of the Western Desert. Those lying to the east and south connected the Fayum to the Nile Valley (where goods were probably taken either to the nomes nearby or to the harbour of Kaine for trans-shipment). Villages in the north of the Fayum, principally Soknopaiou Nesos and Karanis, were linked to the oases, but also to the north with routes to Wadi Natrun and the Oasis of Siwa, and perhaps also to the nomes of the western delta and even as far as Alexandria.

The commodities transported were diverse, and included a large variety of agricultural produce ranging from staples, such as wheat and barley, to more desirable commodities, such as honey, aromatic nuts, fenugreek and dates, to items of furniture and clothing, including linen, cloaks, purple for dyeing,⁷² but the most commonly transported items in the customs receipts were wheat, wine, and oil. Animals also formed an important aspect of trade. There is every reason to believe that almost all of the transport attested was of a private nature, but there is one example of goods being transported for the state—alum from the oases—and that in this instance duty was paid; it is most likely that the transporter was reimbursed. But perhaps the most perplexing question to ask of our evidence is whether it reflects trade or merely the movement of goods between locations, perhaps units of estates. The diverse commodities attested in the receipts are the product of an equally diverse agricultural economy in the Fayum.⁷³ If we briefly consider evidence from elsewhere in Egypt, it is clear, for example, from the numerous private letters preserved in the papyri concerning the exchange of foodstuffs and other items between families and their acquaintances, that there was a significant informal movement of goods around Egypt.⁷⁴ But trade was important—the *metropoleis* of the nomes certainly attracted traders, not only over

⁷² For a statistical analysis of the foodstuffs taken through the customs houses, see Habermann, 'Statistische Datenanalyse'.

⁷³ For a discussion of the products of a Fayum village, see A. Leone, 'Il villaggio di Psinachis', *Aegyptus* 64 (1984), 121–34.

⁷⁴ Examples are too numerous to cite, but see *P. Oxy.* I 113; II 300; X 1293; *BGU* III 830 for example.

some distance, but also local nome inhabitants selling their surplus.⁷⁵ This is clear in an important document from Oxyrhynchos concerning the receipt of payment of market taxes at the market of the Serapeum.⁷⁶ We can be confident that Arsinoe, the metropolis of the Fayum, enjoyed a similarly rich market economy, but the preservation pattern of our evidence, which has yielded few documents from the metropolis and rather more from the desert fringes, offers no similar document. Much of what was imported into the Fayum was probably destined for Arsinoe—almost certainly the case, for example, with wine imported from the oases (the Fayum itself was an important producer of wine) or pickled fish.⁷⁷

In most cases, the customs receipts carefully record the means of transportation—the type of animal used.⁷⁸ Why this should be so is not clear, although it is possible that it served to distinguish between animals used to transport goods, which were not liable to tax, and those animals which were themselves the articles of trade, which were.⁷⁹ At any rate, this information is important on a number of levels: it provides valuable information on the size of caravans, patterns of animal use, and the normal loads carried by particular animals.

The size of caravans was generally small, and surely shows that we are dealing with private transport rather than state transport. It was most common for only one animal, either donkey or camel, to be used; indeed in over half of the receipts which record only caravans made up of donkeys, only one animal is used. The figures are slightly higher in the case of camels.⁸⁰ Instances of up to 4 animals are fairly common, but there are cases of caravans of 19 donkeys and 18 camels, and a considerable number made up of a combination of animals.⁸¹

⁷⁵ On trade and cities, see Alston, 'Trade and the city in Roman Egypt'.

⁷⁶ *SB XVI* 12695 (AD 143), see Rea, 'P. Lond. Inv. 1562 verso' and A. K. Bowman, 'Two notes', *BASP* 21 (1984), 33–8: note II on market taxes at Oxyrhynchos.

⁷⁷ Wine: *P. Customs* 279 and 289; fish, *P. Customs* 322 and 323.

⁷⁸ They are often styled *σκευοφόρος*, which has the meaning 'pack, baggage animal', see *P. Customs* pp. 51–2 with references.

⁷⁹ For exemption from duties, see *P. Customs* pp. 83–4.

⁸⁰ Figures based on Sijpesteijn's, see *P. Customs* pp. 56–7.

⁸¹ *P. Stras.* 250i = *P. Customs* 135, 18 camels carrying *ἄραξ* and *ξύλον*. *SB XII* 10911 = *P. Customs* 202 has 19 donkeys transporting 95 artabas of barley, exported through Philadelphia, no doubt destined for the harbour of Kerke. That the distance to be travelled was short probably explains the rather heavy average load of 5 artabas per animal.

The pattern of animal use is what we might expect—camels were the favoured animal for transport in the desert and appear more frequently in the receipts and registers from villages lying in the west of the nome, while the opposite is the case in villages in the east, where donkeys are more numerous. This might also reflect the pattern of animal ownership, where donkeys were probably the favoured animal in the central parts of the Fayum. If we take a number of villages as examples, the evidence from Soknopaiou Nesos, in the north-west, shows that nearly 71 per cent of animals used were camels, 29 per cent donkeys; from Dionysias, in the west, only camels are evident. In two villages to the east of the nome, Philadelphia and Bakkhias, donkeys make up 78 per cent and 99 per cent of transport animals.

The identity, status, and organization of the transporters is more difficult to establish, for the information recorded is much less precise than the size of load, animals used, or taxes paid. Indeed, in all but 11 cases the first name only of the transporter is given. It is likely that the transporters—especially professionals or regular travellers—would have been well-known to the officials of the customs houses, and this must be the probable explanation also of the not infrequent abbreviation of the name of the transporter. The recording of the name of the transporter must have been important, not only to the state, but also to the transporter when collecting his fee and reimbursement of any expenses on duties or taxes, but the ephemeral nature of the documents didn't demand any more than a first name.

It is not hard to imagine why the transporters came to be well-known at customs stations, for in the customs registers, preserving entries for extended periods, it is clear that the same names recur repeatedly. This information may allow us to identify, with some degree of confidence, those individuals who may be transport specialists. What we need to consider are the regularity of an individual's appearance in the documents, the dates or seasonality of transport (for those who were not specialists, we would not expect to find them transporting during busy periods of the agricultural year), and the number of animals used, which may shed some light on animal ownership or use. The registers also provide some indication of the weight of traffic through the customs houses.

Many transporters only appear once in the corpus. We can be confident that we are concerned with transporters, rather than

traders, as in most cases they transport one commodity only—surely a high risk policy for a trader. While this can neither prove that they were regular or professional transporters, nor show that they were specialists, in a number of cases, it seems clear we are dealing with professionals. One factor strongly suggesting that we are here dealing with professional transporters is that there are very few examples of individuals carrying goods both ways; this would be a risky practice for traders. There are a number of striking examples. The first is of a man named Melas, who appears 46 times in two registers.⁸² He is attested as travelling through the customs house at Soknopaïou Nesos in all but one case, when he appears at the village of Philopator alias Theogenes which seems to have been closely linked to both Soknopaïou Nesos and Karanis in the Herakleides *meris*.⁸³ Here it is stated that he has paid his 3 per cent tax at Philopator, but that he will export his cargo through Soknopaïou Nesos.⁸⁴ The pattern of Melas's activities throws up some interesting problems. Not only do many of his journeys take place in quick succession, sometimes on subsequent days, but, in a number of cases he is listed two or three times in one day in separate entries with different numbers of animals and often different commodities.⁸⁵ Clearly he cannot have made several journeys in one day, so the only explanation is that he had a number of animal-drivers working for him, but that for the purposes of the customs officials, his name was recorded as the taxpayer. The same explanation must hold for those days where he, or his drivers, make journeys on successive days or close in time. Soknopaïou Nesos lay at the terminus of desert routes leading north towards the nomes of the Delta and towards the oasis of Ammon at Siwa. Any destinations on these routes lay at a distance of more than one day's travel, so Melas could not be undertaking these journeys himself in every case, as he could not have returned to Soknopaïou Nesos in time. Even the journey east to Memphis would take some two to three days each way.

⁸² *P. Customs* p. 34, for references.

⁸³ See A. Battaglia, 'Philopator Kome', *Aegyptus* 62 (1982), 124–47, esp. 136–47.

⁸⁴ *P. Customs* 425.

⁸⁵ *P. Customs* 508 and 509—20 March; 525 and 527—2 April; 541 and 543—24 April; 557, 558 and 559—6 May; 700, 703, and 705—12/13 January; 749, 750 and 751—13 of an unknown month; 759 and 762—10/11 December; 766 and 774—15/16 December; 780 and 783—24/25 December; 784 and 787—25/26 December.

It is possible then, as Sijpesteijn suggests, that Melas ran a small transport company, perhaps similar to that of Nikanor in the Eastern Desert, if on a smaller scale and with much less valuable cargoes. It is equally possible that Melas and his associates were in the employ of another individual, perhaps the owner of a large number of camels. We have seen elsewhere that there were large herds of animals owned by families in the village of Soknopaïou Nesos, and it is likely that the owners or keepers (*καμηλοτρόφοι*) employed drivers in order to utilize their livestock. One example of this may be a papyrus from Soknopaïou Nesos which preserves a petition from a female camel-keeper to financial officials of the Themistos *meris* of the Arsinoite nome regarding payment due to her for the transport of state grain in the village of Dionysios.⁸⁶ It is unlikely that the woman drove the animals herself, or did any of the several female owners in the village, some of whom owned a significant number of camels.⁸⁷

The customs registers, covering sometimes extended periods of time, allow us to establish some idea of patterns of transport, and provide evidence of transporters who plied the desert routes regularly. *P. Wisc.* II 80 is a register containing some 106 entries covering 29 August to 27 September AD 114 for the customs station at Bakkhias.⁸⁸ A number of transporters appear more than once, and some more than once on the same day. Bakkhias lay in the east of the Fayum in the Herakleides *meris*, and it is most likely that goods exported from the village were travelling towards the Nile Valley at Memphis, some 45 km distant. This would represent perhaps 2 days' travel each way, allowing for time to deliver and load animals, although the journey could be done in less.⁸⁹ In the case of two individuals we can make a number of observations. On 4 September AD 114, one Ptolemaios exported 4 artabas of black beans on 1 donkey, and on the 8 September of the same year exported 1 keramion of cheap wine (*ὄξος*).⁹⁰ The time interval is consistent

⁸⁶ *P. Aberd.* 30 (c. AD 139), with *BL* III 211.

⁸⁷ *P. Grenf.* II 45a (AD 137), with *BL* III 75, IX 96, for a woman who owned 6 camels; *M. Chr.* 260 (AD 144), with *BL* I 17, for a priestess who sells 2 camels. In both cases it is unlikely that the women actually drove the animals.

⁸⁸ Payments are made for the Harbour of Memphis tax (*λιμὴν Μέμφεως*), which could be paid at the point of departure, the receipt carried as proof of payment.

⁸⁹ On the basis that donkeys could travel between 24 and 30 km per day.

⁹⁰ *P. Customs* 51 and 60.

with a round trip of 4 days between Bakkhias and Memphis, before another journey on 8 September. But Ptolemaios then disappears from our records, thus making it difficult to assess whether he was a professional transporter or perhaps an employee of an estate transferring produce. The case of Apollonios is more clear cut. He appears 8 times in the register exporting diverse commodities from Bakkhias. On 30 August AD 114 he transported 4.5 metretai of oil on 2 donkeys, and on 3 September, transported a total of 14 artabas of black beans on 4 donkeys.⁹¹ Again, it seems, that 4 days separated the two journeys, allowing for a round trip to and from Memphis. Apollonios made five other journeys (and in one may have been accompanied by another transporter).⁹² In one case, 6 days separate journeys, in the remainder 2 and 3 days. It is possible that he travelled more quickly in these instances, as the loads varied in size and weight, and lighter loads would permit better time to be made. It is possible also that his destination may have been a village or estate closer than Memphis. One thing seems clear that, in the case of Apollonios, we are dealing with a professional transporter.

In other registers, similar patterns appear. *P. Amh.* II 77 (AD 139) covers a period of parts of two months of payments for the 3 per cent tax at Soknopaiou Nesos. The journey times are necessarily longer, as routes from this village crossed the desert to Siwa and north to the Letopolite, Terenouthite, and Prosopite nomes, the Wadi Natrun, and the nomes of the Delta. It is likely also that Memphis was a common destination. With so many possible destinations it is not possible to determine with any certainty the length of journeys. It is possible in a number of cases, however, to establish that individuals were professionals: Stotoetis made 3 journeys exporting oil on 5 camels, and in one case a total of 10 camels made up his caravan; Herieus made 5 journeys in July AD 139, one of them very short; and Pabous made 3 journeys between 7 July and 7 August AD 139.⁹³ These three individuals may also be those of the same name who appear alongside Melas, who was mentioned above, in the other customs

⁹¹ *P. Customs* 26 and 45.

⁹² *P. Customs* 64 (8 September); 88 (14 September); 93 and 94 (16 September); 103 (18 September); and 113 (21 September).

⁹³ Stotoetis—*P. Customs* 145, 146, 157, 158, and 172; Herieus—*P. Customs* 147, 148, 167, 168, and 182; Pabous—*P. Customs* 154, 155, 165, and 173.

registers from Soknopaiou Nesos.⁹⁴ Other transporters mentioned frequently are also probably professionals.

The customs registers also permit some estimation of the scale or regularity of transport. A customs register from Philadelphia, probably of Ptolemaic date, not only provides the earliest evidence for the 3 per cent tax, but also of heavy traffic through the village customs house.⁹⁵ Based on the amount of tax collected on the wheat transported, at a rate of 3 per cent, it seems that cargoes to the value of 2 657 500 drachmas were transported through the customs house during the period covered by the register. The editor estimates that a total of 6643.75 artabas per month passed through, which equates to 2214 donkey loads. On average, therefore, 74 donkeys per day passed through the customs house at Philadelphia during this period—an impressive total suggesting much activity. That tax paid on the wheat transported suggests that it was destined for private consumption, possibly for the supply of a city such as Alexandria or Memphis. The fact that the wheat is transported through Philadelphia probably indicates that its destination was Kaine, the closest harbour to the north-east Fayum, whence it would be transported by river to Memphis or Alexandria. In the third column of the document, the month of Pachon is recorded, and this fits well with the pattern of the agricultural year, for this month marked the end of the harvest season, just when we would expect to see a flurry of grain transport. On one level, this may explain the scale of transport, but we have no suitable Roman register to compare. Registers from the Roman period, with one exception, date to other months of the years in which they were recorded. *P. Lond.* III 929 (pp. 40ff.) from Soknopaiou Nesos covers a period from c.18 March to 17 May of an unknown year, but certainly in the second or early third century AD. Only 69 entries are made, and of these 22 date to May. There is no discernible increase in the amount of wheat carried, although it is

⁹⁴ *P. Mich.* inv. 6124, 6131 A–R, and *SPP* XXII 63–5 (all second or third century, but all probably close in time).

⁹⁵ See *P. Thomas* 3. The document could date to either 132 BC or AD 9 (based on regnal date), but the earlier is to be favoured on palaeographic grounds. I would like to thank Professor Clarysse for his correspondence regarding this document. The earliest attestation of the tax in the Roman period is *P. Hawara* 208 = *SB* XX 15189 (AD 43/4).

certainly the most common cargo in the month. However, we would not expect the same intensity of grain transport through Soknopaiou Nesos as through the customs houses in the east of the nome.

The main point of interest between the Ptolemaic register from Philadelphia and those of the Roman period is in terms of scale. In *P. Wisc.* II 80 (AD 114), there are 120 entries covering the period 29 August to 27 September. More than 135 donkey loads were transported; we cannot arrive at a precise total given the lacunose nature of the text, but an estimated total based on the amount of tax paid would be 160, giving an average of 5 animal loads per day. *P. Amh.* II 77 (AD 139) preserves 38 entries covering the period 1 July to 15 August. Unfortunately, details on the number of animals and size of loads are missing for over half the entries, preventing any certainty, but it seems that on no day more than perhaps 7 transports were made. In *P. Lond.* III 929 for the period of 1 month, 139 camels and 16 donkeys passed the station in 69 transactions, giving an average of a mere 5 per day. *P. Lond.* III 1169 (pp. 44ff.) dating from 1 September to 20 January of unknown years has a still lower average—119 animals passed in this period. The remaining registers show similar figures, suggesting a constant and fairly even spread of activity.

TRADE AND SUPPLY IN THE METROPOLEIS

The food supply of the cities of Egypt is a vast subject and cannot be treated in any detail here.⁹⁶ We have considered the systems for the transport of tax-grain destined for Rome, but also of great importance was the supply of the city of Alexandria, second only to Rome in the size of its population, which perhaps stood at some half a million. Memphis, too, was large, at perhaps 250 000.⁹⁷ Other nome capitals such as Arsinoe and Oxyrhynchos were large cities, others smaller; the common denominator for all was their dependency

⁹⁶ See Sharp, *Food Supply*.

⁹⁷ On population figures, see D. Rathbone, 'Villages, land and population in Graeco-Roman Egypt', *PCPhS* 36 (1990), 103–42 and R. S. Bagnall and B. Frier, *The Demography of Roman Egypt* (Cambridge, 1994), 53–6.

on their surrounding nome, and in the case of Alexandria, the *chora*. Much food must have been bought at markets or shops, there is a fine example at the Serapeum at Oxyrhynchos.⁹⁸ A grain dole existed at Oxyrhynchos, Hermopolis, and probably Antinoopolis, which, although probably not catering for the urban poor, but for eligible metropolite citizens, certainly provided something for the city-bound population.⁹⁹ Those resident in cities, but with families living elsewhere in the *chora*, could also rely on parcels of food and other supplies to be sent to them, and there are many examples of this in private letters. Those residents of Alexandria or the other *metropoleis* who owned estates in the *chora* or associated nome could arrange for the produce from their estates to be transported to the city for consumption. This in itself is bound to have stimulated transport and put its organization at the top of the agenda for landowners. As we shall see, this was the case generally in the land economy. Landowners could then live off their produce, but an obvious and important spin-off was the opportunity that this provided to them for selling their produce.

Of the many examples of this practice, two stand out as being particularly informative: the first-century archive of Athenodoros and the third-century example of Aurelius Apollonius, the second of which will be considered in the next chapter.¹⁰⁰ The first comprises some 70 or so papyri dating from the reign of Augustus, either written by Athenodoros or concerning him. He was of Greek descent, and relatively wealthy. He was certainly a landowner,¹⁰¹ but was also a manager (*phrontistes*) of land belonging to a man named Asklepiades.¹⁰² He also held official positions, as *dioicetes* and *epistates* of the Herakleopolite nome, and it seems likely that he was able to use these connections to his benefit, not least with

⁹⁸ On Alexandria, see E. Leider, *Der Handel von Alexandria* (Hamburg, 1934), 71–6; on Oxyrhynchos, see Rea, 'P. Lond. inv. 1562 verso'.

⁹⁹ *P. Oxy.* XL 2892–940 (AD 268–72); *P. Lond.* III 955 (pp. 127–8) = *W. Chr.* 425 (AD 261); for Antinoopolis, see *P. Mich.* XII 629 (AD 166–9).

¹⁰⁰ *BGU XVI* 2600–72; on Appianus, see Rathbone, *Economic Rationalism*.

¹⁰¹ *BGU XVI* 2603 (end of first century BC), a petition to Athenodoros from Lyktos son of Apyis, who describes himself as one of the Athenodoros' farmers.

¹⁰² *BGU XVI* 2662 (4 BC); 2664 (4 BC); and 2605 (5/4 BC) addressed to Gaius Tyrannius, the prefect of Egypt.

the prefect of Egypt.¹⁰³ But he is also described as a merchant—when agents of his inform him that ships, which they were planning to use for the transport of wheat, have been requisitioned for military purposes, and that this is also affecting the price of wheat in the New Market.¹⁰⁴

It is clear from a number of documents that Athenodoros was involved in the transport and sale of considerable quantities of wheat produced from his land; shipments were sent to Alexandria, and were also sold at markets in the Herakleopolite nome. The most informative text also makes it clear that Athenodoros and his colleagues were keen to secure the best possible price per measure by checking prices at different markets.¹⁰⁵ Arrangements for the transport of Athenodoros' produce are difficult to elucidate from our evidence. It does seem that he engaged professional transporters to ship grain, and this fits well with the small number of private shipping contracts preserved on papyrus.¹⁰⁶ But he possibly owned his own ships.¹⁰⁷ What we would like to know more about is the transport of produce both on the land of Athenodoros and how it was carried to the ports of the Herakleopolite nome. On these matters the archive is silent. What is clear is that Athenodoros was involved not only in the production and sale of wheat, but also wine, beer, fleeces, and even birds and fowl. All was part of a flexible and extensive network of contacts and communication. The organization of transport and efficient coordination were clearly of central concern.

Athenodoros was not alone. Even a cursory glance at the many small and large archives of documents and letters belonging to

¹⁰³ *Dioicetes*: BGU XVI 2600 (4 BC). *Epistates*: BGU XVI 2601 (14/13 BC); 2606 (7 BC); and 2637 (3/2 BC). 2605 is a petition to the prefect, which implies that Athenodoros expected his requests to be answered.

¹⁰⁴ BGU XVI 2644 (AD 4).

¹⁰⁵ BGU XVI 2611 (10 BC). The price obtained for the wheat was low, which might suggest state subsidies for city food supplies. In 2601 (9 BC), Athenodoros is criticized for his laziness, the result of which is that his associates will not be able to buy grain for a good price.

¹⁰⁶ See generally Meyer-Termeer, *Die Haftung der Schiffer*. P. Oxy. XLIX 3484 (AD 27–33) is the earliest private shipping contract, in which the shippers are engaged by a third party to carry a cargo of grain to Ptolemais Euergetis and return with a cargo of wine.

¹⁰⁷ BGU XVI 2606 (AD 7).

landowners shows an interest in the transport of their produce for their own consumption and for sale in markets. There can be no doubt that citizens of Alexandria were actively involved in the supply of food and other products to the city, and the same must be true for the *metropoleis* in the *chora*. The case study of Athenodoros must stand as representative of a province-wide pattern.

There is a question of how the involvement of landowners (who themselves were probably metropolitites) in the food supply of cities corresponded to the role of city magistrates and, later, councils in the supply of food to *metropoleis*. This would certainly benefit from further study, especially with regard to Oxyrhynchos, the city about which we know the most, where the activities of magistrates, especially *eutheniarchs* charged with the organization of supplies, are well attested. No detailed analysis can be offered here, for we must focus on the transport of food supplies. About this, we know much less. We have already encountered city donkey-drivers (*δημόσιοι ὀνηλάται μητροπόλεως*), whose main function must have been the transport of grain for the city food supply, but this was only one function of animals within this economy, for they were also involved in, among other things, the grinding of wheat in bakeries.¹⁰⁸ In Oxyrhynchos, the transport of grain for the city must have been a large-scale operation. Whether transport took place by river and canal or by land, its population of some c.30 000 inhabitants would have consumed about 190 000 artabas of wheat annually, which represents about 63 333 donkey loads.¹⁰⁹ No doubt much was carried by barge, but all the wheat had to be transported to the canals in the first instance. As with the transport of state grain, a system including both land and water transport was in place. It is a pity that our evidence for this aspect of transport is poor, affected as it is by the general paucity of evidence from *metropoleis* and their relations with *nomes*.¹¹⁰

¹⁰⁸ See, for example, *P. Oxy.* VI 908 = *W. Chr.* 426.

¹⁰⁹ Based on the usual consumption of 1 artaba per month per person, and the usual donkey load of 3 artabas.

¹¹⁰ Bagnall, *Reading Papyri*, 28.

CONCLUSIONS

It is clear that there was a dynamic regional and inter-regional trade in Roman Egypt. The Eastern Desert saw a highly profitable trade in luxuries. The *metropoleis* of the *chora* were not only the focus of local trade and supply from the nome territories on which they depended, but were also important for traders from outside these nomes looking for good prices in their markets. The larger cities of Memphis and especially Alexandria were the focus of vigorous trade. Egypt exported many products, of which cloth, medicines and glass were important, but also much wine and many other commodities were imported. All of this stood separate from state-driven economies such as the grain supply of Rome and supply of, for example, clothing to the army. But what the evidence from the Eastern Desert shows is that private trade benefited from state-driven initiatives just as the latter benefited from private interests. The economy of the Eastern Desert was, therefore, in some ways symbiotic, in the sense that both state and private enterprise depended upon each other. There is no reason to doubt that the same, to some extent, was not the case elsewhere in the province.

Several features of this economy run contrary to some of the main tenets of the primitivist view of economic behaviour. First, members of the 'elite' classes were heavily involved in trade and commerce, both in luxuries, but also in the marketing of the produce of their lands in the city markets. The notion of mere self-sufficiency on the estates of the wealthy cannot stand scrutiny. The second constituent of the model now comprehensively disproved is the supposed absence of specialist transporters, indeed the evidence of papyri shows specialism in a host of different occupations. As noted elsewhere, not all individuals could own or work land, there were certainly those with time to engage primarily in transport, which for other landowners might be a secondary occupation or, in the case of liturgists, an imposition. But there were opportunities to become heavily specialized, and here the case of Nikanor son of Panes is especially important. Finally, distance or cost of transport does not seem to have adversely affected commercial pursuits. If anything is

clear from the papyrological record, it is that there was heavy demand for a full range of products and services in a diverse and monetized economy. Demand engendered supply, and that meant transport, whether by land or water, was an important factor in the economy.

Transport and the Land Economy

Agriculture was one of the central features of life in Egypt, and within it, transport was of fundamental importance, and is worthy of consideration in isolation from trade and transport in agricultural produce (discussed in the previous chapter). In the Roman period, just as in the preceding millennia, there was what Claire Préaux described as 'l'attache à la terre'.¹ Agriculture in Roman Egypt, then, was firmly rooted in the legacy of this 3000-year bond to land and farming.² However, the advent of Greeks and Romans had a profound effect on attitudes to cultivation as well as on farming practices and the introduction of new crops.³ Agriculture in Roman Egypt must be considered in light of the long legacy of Egyptian agriculture, but also of Roman attitudes to land ownership and farming, not least the changing patterns in, and opportunities for, land ownership.

The nature of the land economy of the Roman world generally, and especially the management of estates, is not easy to establish.⁴ Until recently, scholars of the Roman period relied for their evidence on the writings to the agronomists Cato and Varro, who wrote handbooks on agricultural practice. These set out, often in extraordinary detail, the instruments needed for farming, both articulate

¹ C. Préaux, 'L'attache à la terre: continuités de l'Égypte romaine', in G. Grimm, H. Heinen and E. Winter, *Das Römisch-Byzantinische Ägypten. Akten der internationalen Symposions 26.–30. September 1978 in Trier* (Mainz, 1983), 1–15.

² Bowman and Rogan, *Agriculture in Egypt*, presents an excellent overview of agriculture in Egypt.

³ See D. J. Thompson, 'Agriculture', in *The Cambridge Ancient History*, vol. VII/i, 2nd edn (Cambridge, 1984), 363–70.

⁴ Imperial estates are perhaps better understood, but cannot be viewed as typical.

(slaves) and inarticulate (animals and tools). Advice is given on a wide variety of matters, including the choosing of suitable locations for farmsteads and what crops to grow. But the value of these technical handbooks is limited by a number of factors. First, they provide an idealized picture—traditional Roman values that the ideal Roman landowner should adopt—rather than a true representation of agriculture. To this end they actually help to perpetuate the notion, firmly argued by Finley, that Roman aristocrats sought only modest profits from their land, enough only to provide for their public careers, and that trade and commerce were considered risky and vulgar.⁵ Second, they provide only a limited picture, and fall short of answering our most important questions: did landowners seek to maximize their profits; did they seek to limit capital expenditure in order to increase profit; did they make economically rational decisions? Finally, they are restricted both temporally and geographically. It is only through comparison with evidence from elsewhere in the Roman empire that a more accurate picture can emerge which must take into account regional and local diversity. We must also take evidence from later periods. Cato and Varro were writing in the second century BC, far removed from the economic changes that took place under the emperors.

Cato and Varro have little to say about transport, but what they do include is instructive and shows that they had a clear understanding of its importance in the agricultural economy:

A farm is rendered more profitable by convenience of transportation: if there are roads on which carts can easily be driven, or navigable rivers nearby. We know that transportation to and from many farms is carried on by both these methods.⁶

This is echoed by Cato, who notes that a navigable stream or ‘good and much travelled road’ should be nearby.⁷ Later in the work, Cato prescribes the numbers of pack and draught animals, along with their

⁵ Finley, *Ancient Economy*, *passim*; for commerce and social values, see D’Arms, *Commerce and Social Standing*; for a recent survey, see J. Andreau, ‘Vingt ans d’après “l’Economie antique” de Moses I. Finley’, *Annales: Histoire, Sciences Sociales* 50 (1995), 947–60, republished and translated in Scheidel and von Reden, *The Ancient Economy*, 33–49.

⁶ Varro, *De Re Rustica* 1. 16. 6.

⁷ Cato, *De Re Rustica* 1. 4.

drivers, required for his 'typical' olive yard, with the advice that one should possess an equal number of carts and animals to pull them.⁸ This advice is of little use; there are too many variables—topography, distance from markets, fitness or type of animal—for his figures to be applied generally, and they certainly cannot be used to determine any economy of scale on different-sized estates, as it was probably the case, as we shall see, that landowners sought to reduce the numbers of animals owned by their estates to the bare minimum.⁹

We do possess other evidence for the management of large estates and farms, notably for imperial estates in the Bagradas valley in Tunisia.¹⁰ But it is the Egyptian evidence that is arguably the most illuminating. The archive of Zenon, dating to the third century BC, and the subject of a ground-breaking study by Rostovtzeff in 1922, showed the value of papyrological evidence.¹¹ But the economic environment from which this material originates is not typical. Of much more value are documents from the Roman period. There is much evidence for the operation of imperial estates, the subject of one extended study, but most illuminating are the accounts and correspondence from the so-called archive of Heroninos. Remarkably, until very recently, these documents have largely been ignored by scholars working on the ancient economy, but their value has been amply demonstrated, especially in the work of Rathbone and Rowlandson.¹² There is no doubt that the Heroninos archive provides us with a roster of material beyond comparison, but there is a considerable amount of papyrological evidence that can be used in its support, often archival in nature, but accompanied in a number of cases by long single documents of immense value.

⁸ Cato, *De Re Rustica* 10. 42.

⁹ See estimates of R. Laurence, 'Land transport in Roman Italy: costs, practice and the economy', in Parkins and Smith, *Trade, Traders and the Ancient City*, 129–48.

¹⁰ See the discussion of these estates by D. Kehoe, *The Economics of Agriculture on Roman Imperial Estates in North Africa* (Göttingen, 1988); for imperial estates in Egypt, see Parassoglou, *Imperial Estates*.

¹¹ Rostovtzeff, *A Large Estate in Egypt*.

¹² See the comments of Rathbone, 'The ancient economy and Graeco-Roman Egypt'. On estates and agriculture, see Rathbone, *Economic Rationalism*; D. Kehoe, *Management and Investment on Estates in Roman Egypt during the Early Empire* (Bonn, 1992); Rowlandson, *Landowners and Tenants*. Finley not only distrusted archaeological evidence, but actively ignored papyri, see Andreau, 'Vingt ans d'après', 38, and more fully, R. S. Bagnall, 'Evidence and models'.

The organization of transport on large estates is central to their efficient operation. For the Ptolemaic period, the Zenon archive provides extremely valuable evidence for agriculture, and the estate of Apollonios, even if it was not typical of the character of farming in third-century BC Egypt, was certainly the ancestor of the large estates of the Roman period. It is clear that transport was an important consideration for Zenon, the estate manager. The estate owned a large number of donkeys, but the numbers were not sufficient for its requirements during busy periods of the agricultural year, especially the harvest season, which forced Zenon to find ways of supplementing the available resources, principally through the hiring of additional animals. It was certainly not worthwhile for him to support animals in sufficient numbers for his maximum needs, when these peak times accounted for only short periods of the agricultural year, a feature with which we are now familiar.

For imperial estates of the Julio-Claudian period, few documents serve to illuminate; an accident of the preservation of our evidence.¹³ One papyrus, a petition from an employee on an estate belonging to Livia and Germanicus Caesar to a chief of guards in the Arsinoite nome, mentions a 'superintendent of animals' (προε]στῶτ[ος] [κ]την[ῶν]), named Kallistratos, and it is clear from the context that he is in charge of donkeys.¹⁴ This must mean that the estate possessed a number of donkeys and drivers, with the task of undertaking such transport duties as were required. Kallistratos, it seems, had hired a donkey-driver, whose name is lost, for a period of one year (taking in the harvest season). The donkey-driver had not only disregarded his duties towards the donkeys under his charge, but had harmed them and stolen money and equipment. It is clear from the text that the estate employed donkey-drivers, that they were engaged for set periods of time rather than being permanent employees, and they were supervised by an overseer who was, most likely, a permanent member of staff. One phrase in the text is interesting, as it implies a sum of money set aside by the estate for the payment of

¹³ Parassoglou, *Imperial Estates*, 49.

¹⁴ SB VI 9150 (AD 5–6); see E. Wolfe, 'Transportation in Augustan Egypt', *TAPA* 83 (1952), 80–99, with Nielsen and Worp, 'New papyri', 163–86, esp. no. 3, 173–6, for a new reading.

donkey-drivers, which can be distinguished from other transportation charges.¹⁵ All we can surmise from this is that there was a supply of animals and transporters, paid for by the estate, supplemented at times by additional workers, and that those animals that worked on imperial estates may have been exempt from requisition, as is clear from one short text.¹⁶

Our evidence is rather better for privately owned estates, and especially that belonging to Aurelius Appianus, documented by the archive of Heroninos. This has been the subject of a major study by Dominic Rathbone.¹⁷ In this, he presents a detailed account of the systems of transport used on the estate, and what emerges is a centrally directed system, designed to make the most efficient use of resources.¹⁸ This indicates a much more complicated and economically rational approach to the problems of transport than that shown by Cato or Varro, briefly discussed above.

Efficient communication and transport were essential to the running of any estate, the more so given the nature of ancient landholding patterns. These have been the subject of a number of important and very detailed studies.¹⁹ Drawing general conclusions from our evidence of landholding patterns is difficult, mainly because of local and chronological variations, or because our evidence relates to different, and not necessarily compatible, categories of land. But it seems safe to say that, as a rule, with both small-holdings and larger estates, it was common for landowners to possess land in different locations, rather than in contiguous estates. This is a pattern that

¹⁵ Neilsen and Worp, 'New papyri', no. 3, l. 20—τὰ ὑποκείμενα ὄνηλατικά. This should be distinguished from *φόρητρον*, a general transport charge.

¹⁶ SB I 4226 (second century), a bronze animal tag declaring the beast free from liturgical service or requisition—*Ἀγρειππινιανῆς καὶ Πουτυλλιανῆς οὐσίας τοῦ κυρίου Αὐτοκράτορος ἀτελῆν καὶ ἀνεψάρουτον*, see Wilcken, *Griechische Ostraka* i p. 392 and *Grundzüge*, 376.

¹⁷ Rathbone, *Economic Rationalism*, who argues convincingly that the estate was the private property of Appianus, rather than an imperial *ousia*, see esp. 14–22.

¹⁸ Rathbone, *Economic Rationalism*, 266–78.

¹⁹ A. K. Bowman, 'Landholding in the Hermopolite nome in the fourth century AD', *JRS* 75 (1985), 137–63; R. S. Bagnall, 'Landholding in late Roman Egypt: the distribution of wealth', *JRS* 82 (1992), 128–49; Rowlandson, *Landowners and Tenants*, esp. 102–38; and see now, *P. Yale* III 137 (AD 216), from Philadelphia in the Arsinoite nome.

holds true for most of the Roman world.²⁰ Thus, different units belonging to the same estate could be separated by some distance, and a pooling of transport resources became necessary. In effect, the scattered nature of landholding resulted in transport being placed near the top of the agenda in the rural economy. These are points to which we will return, after considering the evidence in more detail.

Rathbone, then, has established that a centralized transport system existed on the estate of Aurelius Appianus. But what evidence exists for transport on other estates, and can we establish that the approach of Appianus and his estate managers to issues of transport was one that was widespread? Can we say that the role of transport in agriculture was subject to economically rational decisions, and were these adopted by all farmers? We must turn to the Appianus estate and its organization of transport, before considering how this relates to other evidence.

THE ESTATE OF AURELIUS APPIANUS AND THE HERONINOS ARCHIVE

The third-century estate of Aurelius Appianus, like other estates, consisted of scattered holdings of land throughout the Arsinoite nome. Resembling the units of land documented in *P. Mich.* XI 620, to which we will turn later, units were associated with particular villages, but were coordinated from a central administration in Arsinoe. There is little doubt that Appianus owned land in other nomes, although no direct evidence survives. Our evidence for the estate comes from a large archive, of which some 450 texts have been

²⁰ Compare the well-known letter of Pliny concerning his planned purchase of an estate in *Ep.* 3. 19, see D. Kehoe, 'Allocation of risk and investment on the estates of Pliny the Younger', *Chiron* 18 (1988), 15–42; id., 'Approaches to economic problems in the "Letters" of Pliny the Younger: the question of risk in agriculture', *ANRW* II 33.1 (1989), 555–90; P. W. de Neeve, 'A Roman landowner and his estates: Pliny the Younger', *Athenaeum* 68 (1990), 363–402. For Egypt, such a pattern is made clear, for example, by *P. Flor.* I 50 (AD 268), which details the division of inherited property at Hermopolis Magna between two brothers and their sister. The estate was divided into numerous plots, most comparatively modest in size.

published, belonging to Heroninos, the manager of the unit (*phrontis*) at Theadelphia in the Themistos *meris*. The huge amount of evidence presents a unique picture of economic life, but is inevitably limited in a number of ways: we learn most about the *phrontis* to which Heroninos was attached and to which the archive therefore relates, and other *phrontides* and the central administration in Arsinoe are mentioned only in relation to the unit at Theadelphia—reflecting the pattern of papyrological evidence from the Fayum more generally, in which the outlying villages are better attested than Arsinoe, and the latter only in its relations with those villages.

Rathbone's study reconstructs economic life on the estate and argues for a great level of sophistication in accounting, and an economically rational approach to minimizing capital outlay, which indicates a central interest in maximizing profit inconsistent with the traditional view of estate management in the ancient world. Of central importance to the efficient and profitable running of the estate was transport, and the estate developed a centralized system of transport to increase efficiency and maximize profit. As Rathbone puts it, 'for reasons of economy the overall level of transport resources was geared to the estate's average needs, while at peak times of demand extra outside carriers were hired', and 'this hiring to make up temporary shortages was a necessary concomitant of the policy of employing permanently only as many draught animals as could be usefully employed all year round'.²¹ There is little to add to Rathbone's compelling study of transport, and what follows is a summary of his findings, with which other evidence will be compared.

Rather than relying on purchasing goods or equipment from outside the estate, the requirements of individual *phrontides* were met by transferral from others. This meant considerable levels of transport and communication between them, centrally directed from Arsinoe. The estate's constant drive towards efficiency is well illustrated by a letter written by Appianus to Heroninos, which clearly shows irritation:

²¹ Rathbone, *Economic Rationalism*, 271–2, and 274.

If anyone sends up even the most unimportant item, he should send it up with a note and indicate what is being sent up through whom. What you sent up was not worth the wasting of the time of a man and donkey, all for four measly baskets of bitter figs...and the one at Euhemeria [the *phrontistes* Eirenaios] sent up another with a few things when, both of you, if one had informed the other, could have sent up through one.²²

Flexibility and the most efficient use of transport resources was the goal. Animal drivers were only nominally attached to a *phrontis*, and although they may have drawn their monthly *opsonion* from it, drivers were often absent from their *phrontis* for significant stretches of time performing transport tasks elsewhere. Indeed, Rathbone has shown that, on average, as much as half of their working time was spent at other locations.²³ Equally, animal-drivers attached to other *phrontides* appear working at Theadelphia, and figure regularly as such in the 'records of work' drawn up by Heroninos and presumably his fellow managers, even if they are not paid for by that unit.²⁴ If Rathbone's hypothesis that the 'records of work' from each of the estate units were gathered and analysed, so that more efficient deployment of transport resources could be made in the future, is correct, then this is surely an important indication not only of the central importance of transport, but of a clear economic rationale.²⁵ An accurate estimate of transport requirements at each unit not only allowed for the concomitant dispersal of available animals, but also estimates of the amount of fodder and maintenance required. Expenditure in fodder is carefully recorded by Heroninos in accounts of hay, similar to those on the Titanianus estate preserved in *P. Mich.* XI 620.

The most striking feature of transport on the estate is the pool of transport animals kept at the centre in Arsinoe. Most of the donkeys and their drivers were dispersed around the estate units, but about half of the oxen, and all of the riding-donkeys, camels and horses were kept at Arsinoe. They were used to perform transport tasks

²² *P. Flor.* II 176 (trans. Rathbone).

²³ Rathbone, *Economic Rationalism*, 268.

²⁴ For example, in *P. Flor.* II 207 a wagon and driver are seconded to the unit at Theadelphia, and Heroninos is ordered to supply him with fodder—an unnecessary order if he was attached to the unit.

²⁵ Rathbone, *Economic Rationalism*, 278.

where necessary, and for communication. Most important were the camels, which were used for heavy tasks such as the transport of wine from the units to Arsinoe for sale or onward transport. Although, as Rathbone notes, no estimate can be made about the number of animals owned by the estate, records of work for 25 camels are preserved, suggesting that this number at least must have been maintained (and this compares favourably with the size of camel herds known from Soknopaiou Nesos).²⁶ It is clear that this corps of animals was used to supplement transport throughout the estate, to fill gaps in provision, but it is equally clear that resources were stretched to the limit at busy periods. A good example is a letter from Appianus to Heroninos, in which he writes:

and since we have dispersed our camels among the *phrontides* which do not have donkeys for the remaining work of the vintage, let me know whether your tasks have ended in advance so that two four-donkey teams can come up with the one from Philoteris to carry the wine jars.²⁷

Even among the papers making up the Heroninos archive, there is no direct evidence for how transport was coordinated or who was in charge—no doubt because we do not have evidence from the centre at Arsinoe. There is some evidence for an *epiktenites*, a man in charge of animals.²⁸ Details are hazy, but it is likely that the role of this individual was to supervise the stables and animals at Arsinoe, and it is probable that this extended to the provision of and accounting for fodder, as well as the keeping of records on animals distribution throughout the estate. It is a reasonable hypothesis to suggest that they performed similar functions to the *archonelatai* mentioned in other documents.

As we shall see, there are clear similarities in the organization of transport on the estates of Valerius Titianus and Aurelius Appianus. It is not surprising on two levels: first, that there may have been personal links between the owners, and second, that they lay in close proximity and the methods adopted on the estates were fairly transparent. The question arises of the extent to which

²⁶ *P. Flor.* III 364, with Rathbone, *Economic Rationalism*, 270–1, with n. 7.

²⁷ *P. Flor.* II 175.

²⁸ Rathbone, *Economic Rationalism*, 276–7, with nn. 15–16.

these practices were universal, and whether similar strategies in the organization of transport adopted by other landowners and those who owned smaller estates.

EVIDENCE FOR TRANSPORT ON OTHER ESTATES

There is no doubt that the estate of Aurelius Appianus is by far the best documented in the ancient world, but we have other accounts from the estates of Valerius Titanianus and Epimachos; because they cover a considerable period of time within the agricultural year, they are extremely valuable. But other evidence exists from Egypt which is in many ways as rich: we have substantial archives relating to the families and landholdings of Sarapion, the descendants of Laches, the landowners and tenant farmers Soterichos, Kronion, and Aurelius Isidoros, as well as the smaller estate of the veteran Lucius Bellenus Gemellus, among others.²⁹ Additionally, a number of individual papyri relating to large estates can supplement the evidence of archives.³⁰ We will turn to these below.

The estate of Epimachos

The estate of Epimachos son of Polydeukes is attested in a long and particularly important papyrus, not least because the verso preserves

²⁹ On Sarapion, see J. Schwartz, *Les archives de Sarapion et ses fils: une exploitation agricole aux environs d'Hermopolis Magna (de 90 à 133 P. C.)* (Cairo, 1961), with Kehoe, *Management and Investment*, 67–72; on the descendants of Laches, see W. S. Bagnall, *The Archive of Laches*, with Kehoe, *Management and Investment*, 74–92; on Soterichos, see S. Omar, *Das Archiv von Soterichos* (Köln, 1979), with Kehoe, *Management and Investment*, 141–8; on Kronion, see D. Foraboschi, *L'archivio di Kronion* (Milan, 1971), with Kehoe, *Management and Investment*, 149–58; on Aurelius Isidoros, see A. E. R. Boak and H. C. Youtie, *The Archive of Aurelius Isidoros* (Ann Arbor, 1960), with Kehoe, *Management and Investment*, 158–65; on Lucius Bellenus Gemellus, see P. Fay, 110–23 (AD 94–110) from Euhemeria, with N. Hohlwein, 'Le veteran Lucius Bellenus Gemellus, gentleman farmer au Fayoum', *Études de Papyrologie* 8 (1957), 69–91.

³⁰ See Rathbone, *Economic Rationalism*, 401–2, with n. 4.

Aristotle's *Athenaion Politeia*.³¹ The document preserves an account of monthly expenses for an estate in the Hermopolite nome, and dates from AD 78–9. The account is made up of details of daily receipts and expenditure covering a period of almost a year, drawn up by the steward of the estate, Didymos son of Aspasios. Epimachos' estate was certainly not comparable in size to the great imperial estates, or those of Aurelius Appianus or Valerius Titianianus in the third century, but was modest. The size of the unit of which Didymos was in charge was perhaps about 50 arouras. What we know from the accounts, however, demonstrates that the estate was run on similarly economically rational terms and arguably had similar economic goals to the larger estates already mentioned. Additionally, Epimachos variously leased other lots to tenant farmers, rented land himself, or came to arrangements with other landowners on some 10 other plots of land ranging in size from 2 to 12 arouras. These arrangements are similar to those we find with other landowners such as Sarapion, whose family owned land but maximized their profits by renting other plots.³²

The estate was divided up into small allotments, each farmed by a different individual: Hedylos, Oulemis, Hippostratos, Apollonios, Satyros, and Indios, under the direction of the steward Didymos. There was an allotment at Tomis, which was probably farmed by one Psenenis and his associates. The estate included these allotments, a palm grove, vineyard and garden land, and was served by a house, bathhouse, dovecote, *helasterion*, *comasterion*, wells, cisterns and waterwheels for perennial irrigation. Profit was generated probably through the sale of wine, wheat, reeds and vegetable seed, but there is little record of sale in the account, which precludes any estimate of annual profit.

Patterns of transport found on the estate of Epimachos reflect those on other larger estates. He seems to have kept a small number of animals and supplemented their numbers at busy periods.

³¹ *P. Lond.* I 131 recto (pp. 166–91), with translation and commentary in Johnson, 'Roman Egypt', 177–201. A detailed discussion of the text is provided by A. Swiderek, *La propriété foncière privée dans L'Égypte de Vespasien et sa technique agricole d'après P. Lond. 131 Recto* (Warsaw, 1960), with other commentaries and discussions of the text noted at 75, n. 1, the most important of which is Schnebel, *Die Landwirtschaft, passim*.

³² This strategy was widespread and is discussed at length by Kehoe, *Management and Investment*, 119–67, and especially, Rowlandson, *Landowners and Tenants*.

Epimachos employed at least two full-time transporters. Papontos, the ἀρχονηλάτης, is recorded in a number of transactions, and seems to have been responsible for not only performing transport tasks, but also managing Paos, the only other donkey-driver under regular employment, and coordinating the hire of animals and wagons to supplement the estates' own animals.³³ The ὄνηλάτης Paos seems to have had similar responsibilities: he had charge of three donkeys, which may have been his own (as wages are paid to boys to drive them), and was responsible for the hire of manure carts. Both Papontos and Paos appear infrequently, which suggests that they may have been away performing duties on other units of Epimachos' lands, or perhaps were engaged in personal transactions, as employees of large estates were often able to pursue private business, and there is no reason to suspect that those of smaller estates could not do likewise.³⁴ Indeed it is likely that during slack periods of the agricultural year, farmers and farm employees, if they owned animals, attempted to supplement their incomes by undertaking other employment transporting goods either for the state or for private individuals.

The striking point about the accounts is that Epimachos seems to have owned very few animals.³⁵ The number is not entirely clear from the text, but the majority, if not all, of the animals mentioned are hired. Epimachos may have owned one wagon, but often hired others. Manure carts are hired during the months of Mesore and Thoth (August/September), which coincided with the sowing season and came at the time when manure was dry and easy to transport, and donkeys were hired during Phaophi (October) to carry pigeon dung and manure used for fertilizer. In the months of Mechir to Pachon (February to May), both wagons and donkeys were hired for the harvest season. It is clear that Epimachos supplemented his transport capabilities at crucial times of the year. This economically rational approach enabled Epimachos to minimize his capital outlay and maximize profits.

³³ For the hire of animals, *P. Lond.* I 131 recto, col. xv. l. 336 and 343. For Papontos' role in transport, see ll. 500 and 579, where he is seen transporting sheaves to threshing floors.

³⁴ Swiderek, *La propriété foncière*, 70.

³⁵ Swiderek, *La propriété foncière*, 65–6, commentary to col. xiv ll. 321–3.

The estate of Valerius Titanianus

The main evidence for this estate comes from two pieces of a papyrus roll held in the collections of Cornell and Michigan Universities.³⁶ Together they preserve the accounts of a large Fayum estate, drawn up by the overseer Alkimedon for Valerius Titanianus, a wealthy and distinguished landowner.³⁷ The accounts cover a six-month period of rents from Phamenoth to Mesore (March to August) in AD 239; the beginning of an account of expenditure in money and kind for Mesore in the same year; the end of an account for Hathyr (November) of the same year; a complete account of expenditure for Choiak (December) AD 239; and the beginning of an account for Tybi (January) AD 239–40. Internal evidence suggests that the accounts were prepared by the fifth day of the month following the period to which they relate.

As we would expect, Valerius Titanianus' estate consisted of small units scattered over a wide area—doubtless he owned land throughout the Fayum and probably in other nomes.³⁸ We have evidence for holdings in Dionysias, Alexandrou Nesos, and Theadelphia, all in the north-west of the Themistos *meris* of the Arsinoite. Further units existed at Philadelphia in the Herakleides *meris* and at Arsinoe. The units lay within easy travelling distance of each other affording good communications and the ability of the managers at Arsinoe to disperse animals throughout the various estate units as best suited their purposes.³⁹

³⁶ *P. Corn. inv.* II 25 and *P. Mich. inv.* 273, published as *P. Mich.* XI 620 (AD 239–40). See also *P. Gen.* I 1; *P. Iand.* III 36; *P. Stras.* V 459 and 460.

³⁷ On Valerius Titanianus, see N. Lewis, 'The non-scholar members of the Alexandrian Museum', *Mnemosyne* 16 (1963), 257–61, reprinted in id., *On Government and Law in Roman Egypt*, 94–8; J. F. Gilliam, 'Valerius Titanianus', *Mnemosyne* 17 (1964), 293–9, reprinted in id., *Roman Army Papers* (Amsterdam, 1986), 293–9; id., 'An *ab epistulis Graecis* and *praefectus vigilum* from Egypt', in *Mélanges d'histoire ancienne offerts à William Seston* (Paris, 1974), 217–25, reprinted in id., *Roman Army Papers*, 243–51; Rathbone, *Economic Rationalism*, 56–8.

³⁸ The wide dispersal of property was first noted by M. Rostovtzeff, *Studien zur Geschichte des römischen Kolonates* (Leipzig–Berlin, 1910), esp. 124, discussed generally by Kehoe, *Management and Investment*, *passim*. Outside Egypt, the same patterns are evident, see Kehoe, 'Allocation of risk and investment'; id., 'Approaches to economic problems in the "Letters" of Pliny the Younger'; and works cited in id., *Management and Investment*, 4, n. 9.

³⁹ For example, see *P. Mich.* XI 620 l. 284 which shows that a journey of one day separated the units at Dionysias and Theadelphia, as a group of donkeys arrives on one day, departs the next, and returns the following day.

The estate was managed in a familiar fashion, similar to that used on imperial estates and, as we have seen, on the estate of Aurelius Appianus. Aurelios Arieos, the estate manager, held overall responsibility for administration, which included the leasing of land to tenant farmers, collection of revenues and payments of any taxes due, and the day-to-day management of agricultural practice—the coordination of work throughout the agricultural year, and, importantly, the allocation of transport resources and the hire of extra animals and labour as required. It was to Aurelios Arieos that the managers of the individual units submitted their monthly accounts. Besides these managers, whose function was the supervision of all matters on a particular unit, the estate employed animal-drivers, builders, carpenters and gatekeepers, all of whom were monitored by foremen, whose function may have been to oversee small plots of land within the unit, in the same way as Hedylos and his companions did on the estate of Epimachos. There are few details recorded about the payment of regular employees, but in col. vii recto ll. 162 and 163, a monthly *opsonion* is paid to a bull-driver and a donkey-driver, and suggests that their salaries were taken as an expense from Alkimedon's unit at Sphex and Aristokles. This pattern of payment is now well known.⁴⁰ These regular employees were paid a monthly salary (*opsonion*) and were thus not included on lists of daily wages paid to hired, casual labour. They may also have received free lodgings (l. 50). But casual labour, too, formed a vital part of economic and agricultural life on the estate, as hired labour and transport were drafted in at busy periods of the year. Animal-drivers and other workers were taken on at the rate of 2 drachmas per day in order to perform various tasks.⁴¹

Transport issues form an important aspect of life on the estate units, and they are heavily represented in the accounts, allowing for patterns of animal use on the estate to be reconstructed with some confidence. A central core or troop of animals owned by the estate existed and these were spread among the various units. It seems also that a central pool of transport animals was kept at the estate's centre, which was probably at Arsinoe, and these could be allocated to units

⁴⁰ Rathbone, *Economic Rationalism*, 266–7; Swiderek, *Propriété foncière*, 100.

⁴¹ *P. Mich.* XI 620 ll. 130, 134, 137, 139, 142, 145, 147, 150.

as and when required for specific transport tasks. Although there is no clear evidence for the hire of animals in the text, it is not unreasonable to assume that the number of animals belonging to the estate was not sufficient to cover its transport requirements at all times of the year.⁴² It would not have made economic sense for the estate to own so many animals that, for long periods of the year, many would remain idle. That this was of concern to the estate managers is demonstrated by the accounts, which are particular in recording the length of time that animals remained idle; no doubt it was the responsibility of unit managers to see that they did not remain so for long, and, further up the chain, of Aurelios Areios to ensure that they did so.⁴³

Transport animals and their drivers performed various tasks on the estate. In col. vi recto ll. 122–52, in various entries, 4 female donkeys and their driver Polion were engaged in the transport of gravel and sand for the repair of the bath at Alkimedon's unit Spheh. Eight male donkeys were used to carry *sebakh* and sand to the estates' vineyard, managed by Aimnestos. Col. ii verso ll. 203–27 preserves an account of expenditure on hay for the month of Choiak tendered by Alkimedon for the estate properties near Theadelphia. It is clear that the animals mentioned are not attached to the units at Theadelphia, but either to other units on the estate or the central administration of the estate at Arsinoe, for the number of days under Alkimedon's care are carefully numbered, along with the number of bales of hay consumed. Three female donkeys and 2 foals, no doubt being broken in, were at Theadelphia for 17 days, 2 riding-donkeys and 1 horse for 11 days, and finally 12 camels were sent from Arsinoe to collect wine.⁴⁴

⁴² *P. Mich.* XI 620 l. 324 mentions donkeys owned by Herakleides, and driven by Kastor the donkey-driver, but the context is too unclear for conclusions to be drawn on the status of the animals.

⁴³ *P. Mich.* XI 620 l. 254; 294.

⁴⁴ The camels are described as 'belonging to the "master" or "gentleman"' (*τοῦ εὐσχήμονος ἐλθόντων*)—the editor translates 'magistrate' (note to l. 41), but it is hard to see why in this capacity he would be supplying animals for everyday transport duties on a private estate, see N. Lewis, 'Εὐσχήμονες'. For camels so described on the estate of Aurelius Appianus, see *P. Prag. Varcl.* I 14 on Antonius Philoxenos, the son-in-law of Appianus.

The wine the camels transported from Theadelphia is detailed in the next account. 300 *Oxyrhynchitia* (450 *monochora*) were transported—100 to Philagris to Sabinos (a wine merchant), 100 to Magais to Sarapas (also a wine merchant), and 100 to Soterichos the *phrontistes* at Dionysias.⁴⁵ The figures indicate an average load per camel of $8\frac{1}{3}$ *Oxyrhynchitia* ($12\frac{1}{2}$ *monochora*), which probably translated into 10 camel loads of 8 and 2 of 10 *Oxyrhynchitia*, so distributed because the weight had to be equal on both sides of the animal.⁴⁶ Clearly then, animals were used for transport purposes on the estate, but also to transport the produce of the estate for sale, seemingly through agents. In the same account, 3 female donkeys in the charge of Polion made a welcome return to Theadelphia, where, for 17 days (with one spent idle), they were engaged in the transport of chaff used to bolster the mud walls of the vineyard. On the 18th day, at dawn, they were sent to the unit at Alexandrou Nesos.

The camels were sent from the central administration of the estate at Arsinoe, as was a troop of 24 male donkeys sent to carry 79 artabas and 2 metra of wheat from Alkimedon's unit back to Arsinoe.⁴⁷ This troop appears three times in the accounts in cols. iv and v verso, and along with 4 female donkeys and 1 foal, 2 riding-donkeys and 1 horse, were stabled at Alkimedon's units for several days and nights. The large troop of donkeys was taken to the unit at Dionysias and returned the following day, no doubt receiving their fodder at that unit for the day they was present. It seems certain that the cost of maintaining the animals was spread across the different units of the estate. These costs must have been significant—donkeys were given

⁴⁵ *P. Mich.* XI 620 ll. 228–39, with notes. The *Oxyrhynchition* measure equalled $1\frac{1}{2}$ *monochora*. See *P. Giss.* I 34 = *M. Chr.* 75; *P. Lond.* III 1170 verso, ll. 142ff. (pp. 193–205).

⁴⁶ Suggested by the editor, n. l. 232. This fits well with the normal load of a donkey, which appears to have been 8 *monochora* or a little over 5 *Oxyrhynchitia*, see Rathbone, *Economic Rationalism*, 470–1 for references and discussion, and 464–71 on weights and measures generally. In *P. Lond.* III 1170 verso ll. 163–5, 3 donkeys carry 18 *Oxyrhynchitia*, a load of 6 each. A camel load of 10 would therefore seem entirely reasonable. The distribution of animal loads and how they were carried is made clear in the animal terracotta statues preserved from Egypt, see Nachtergaeel, 'Le chameau, l'âne et le mulet'.

⁴⁷ The amount each donkey carried was about $3\frac{2}{3}$ artabas, compared to the average 3 artabas, but larger loads were common.

10 bundles of hay per day, and foals 3 (ll. 219 and 281–96). Camels, mules, and horses received 12 bales (ll. 224, 284, 287, 221, and 290).⁴⁸

A number of animal-drivers were employed by the estate, seemingly on a regular or permanent basis. Ten donkey-drivers are recorded, but there may have been more. The donkey-driver Polion and his animals were connected to the unit at Alexandrou Nesos, while the donkey-drivers Herakles, Ammonas alias Sarapion, another unknown driver, and Kalamos were attached to the large troop of animals and were probably based at Arsinoe. Two camel drivers, one named Antieps and another unknown were probably similarly based. It seems that in most circumstances donkey-drivers had charge over 4 animals, and camel drivers over 6, but this is likely to have varied considerably. Casual labour was employed at certain times, and an interesting question, and one to which we shall return, is the source of this. Was there a pool of casual labour available?

Many of the characteristics of transport on Valerius Titanianus' estate—rational use of limited transport resources, maintenance of animals and salaries of animal-drivers spread among the units of the estate, and a central pool of transport animals available for use on any units according to need—feature on the roughly contemporary estate of Aurelius Appianus, as we have seen.⁴⁹

The archive of Sarapion

The family of Sarapion were owners and cultivators of land in the Hermopolite nome, and a fairly substantial archive dating from AD 90–133 preserves considerable information about their affairs. Their land was concentrated near Hermopolis, but the centre of the estate seems to have been located at Magdola Mire in the north-west of the nome.⁵⁰ There is no clear evidence for the amount of land which they owned, but we can be confident that it was fairly extensive—probably several hundred arourae—even if this fell well short of the largest recorded holding in the nome in the fourth century of slightly over

⁴⁸ For fodder requirements, see Reekmans, *A Sixth Century Account of Hay*, 26–37.

⁴⁹ On relations between the estates, see Rathbone, *Economic Rationalism*, 14–22.

⁵⁰ Most of our evidence comes from this village, and therefore its importance in the archive may be skewed.

2000 arourae.⁵¹ The estate was divided into small parcels of land, and importantly, Sarapion augmented his estate by renting additional land. This allowed the Sarapion family to spread risk and diversify their economic pursuits: cereals, fodder crops, vegetables and some fruits were grown, and there is limited evidence for the production of wine, but none for oil; livestock were kept, including cattle and sheep, and pigeons were reared for fertilizer, meat and eggs.⁵²

But it is perhaps the nature of the documents forming the archive which means arrangements for transport on the estate are difficult to elucidate. The majority of documents are letters exchanged between family members, rather than monthly accounts, so matters of transport tend to be too mundane to mention. But there are some exceptions to this rule. In a document of AD 119, ownership of 2 male donkey foals is declared, and it is expressly noted that they were not for hire, but solely for private use.⁵³ It is not usual to find such a statement on animal-declaration documents, and it must imply that a higher rate of tax was payable on those animals which were hired out, but falls short of being direct evidence that the family of Sarapion did so. We know that Sarapion's family hired animals to supplement their own for various kinds of farm work, and that it relied on public donkey-drivers to transport grain paid as tax in kind.⁵⁴

It is clear that Sarapion owned animals, clear also that animals were hired to supplement his own. The evidence for hire falls within the months of June and July, towards the end of the harvest season. But an important question, and one to which we will return, is whether Sarapion, and landowners like him, rented out their own animals at slack periods of the year. *P. Sarap.* 3 implies, albeit *ex silentio*, that they may have done. This may have been a common way

⁵¹ See Bowman, 'Landholding'.

⁵² Wine—*P. Sarap.* 80; cattle—*P. Sarap.* 4, 5, 10, 11, 12; sheep—*P. Sarap.* 52, 87; pigeons—*P. Sarap.* 79.

⁵³ *P. Sarap.* 3 ll. 4–6: οὐκ ἔχω ὄνου ἀρκεναι πῶλον δύο μὴ ἐργαζομένο(υς) μισθοῦ ἀλλ' εἰς ἰδίαν χρεῖ[α]. We know that the family owned additional animals from *P. Sarap.* 79d, a fragment of document preserving details of transport tasks undertaken by one Eutychides, who made 3 journeys in 1 day, carrying 7, 6, and 9 artabas of barley, which suggests a short journey.

⁵⁴ *P. Sarap.* 55 (AD 128); *P. Sarap.* 1. (AD 130).

for owners to supplement their income, when otherwise animals might have lain idle.

The archive of the descendants of Laches

More instructive on matters of transport than the archive of Sarapion, is a body of texts relating to a family thought to descend from a man named Laches, which owned land amounting to some 500 arouras around the villages of Theognis and Tebtunis in the Polemon *meris* of the Arsinoite nome during the second century AD.⁵⁵ The land was scattered over the territories of about 11 villages in a total of 161 small plots, ranging in size from 1 to 38 arouras.⁵⁶ It is likely that the family lived in Arsinoe, the metropolis of the nome, and probably directed the affairs of the estate from there. Our evidence consists mainly of accounts of expenses incurred in the cultivation of this land, and indicates that the family exploited their holding in much the same way as other landowners we have discussed—namely the scattering of limited resources and spreading of risk. As far as they can be made out, patterns of transport compare with those on the estates discussed above, but the spread of evidence through time allows no quantification or precision in the assessment of transport requirements.⁵⁷

Animals belonging to the estate seem to have been distributed between its constituent units, and appear to have been centrally directed. A letter from Herakleides to a *phrontistes* of a unit issues instruction for the use of oxen and donkeys, the latter to be used for the transport of reeds to another unit at Talei.⁵⁸ It is apparent from other letters that *phrontistai* of estate units could make requests for animals to be sent from the centre of administration.⁵⁹ From an account of expenditure on fodder, dating from June AD 162 to

⁵⁵ For discussion, see W. S. Bagnall, *The Archive of Laches*.

⁵⁶ Commentary to *P. Mil. Vogl.* VII, pp. 19–27.

⁵⁷ See the evidence for the hire of animals tabulated in *P. Mil. Vogl.* VII pp. 27–35, where the accounts can be securely dated, runs from AD 109–67.

⁵⁸ *P. Mil. Vogl.* II 70 (second century).

⁵⁹ *P. Mil. Vogl.* VI 279 (end of first century), a letter of Patron to Laches requesting a donkey to be sent; and *P. Mil. Vogl.* VI 281 (second century), a letter from Geminus to Kronion, stating that a donkey will be sent to him two days later.

March 163, it is clear that the estate's animals were engaged in the transport of commodities between units of the estate, including one at Ibion Argaiou, and to the centre at Arsinoe.⁶⁰

There is considerable evidence for the hire of animals and drivers on the estate.⁶¹ It seems that the estate found it necessary to employ additional animals and drivers, not just during harvest time, but throughout the year. Heavy work was required in the repair and maintenance of irrigation channels—and animals were hired to carry stone or earth for this reason more than any other. There is no evidence in the archive for members of Laches' family hiring out their own animals, but it is possible that they were able to supplement their income through animal breeding. We know that one member of the family, Ptollarion, owned horses, which were used solely for riding.⁶² The presence of mules on the estate shows that their breeding was encouraged, and this could not only provide strong working animals for the estate, but also generate livestock for sale.⁶³

Miscellaneous documents

P. Cairo Goodspeed 30 (AD 191/92) is a long roll of papyrus preserving 47 columns, which makes up a farm account covering a period of at least 7 months. Internal evidence suggests that the accountant kept notes in daybooks and copied up accounts covering several days in one sitting, and adopted a method very similar to modern double-entry bookkeeping.⁶⁴ No details of the estate in Karanis or of its owner

⁶⁰ *P. Mil. Vogl.* I 28. See also *P. Mil. Vogl.* IV 216 for donkeys carrying sacks from a unit at Thegonis.

⁶¹ *P. Mil. Vogl.* IV 212 recto ii 6; verso ix 6; VII 302 viii; 302 ix; 302 x; 302 xi; IV 214 i, 22–4; 214 ii, 7; 216, 5; 28; VII 303 ii; 304 iv; 304 vi; 304 vii; III 152, 56; *SB* VI 9493; *P. Mil. Vogl.* VII 308 i; 308 ii; 308 iii; 308 v; 305 ii; 305 iii; 305 v; and 306 i. The references are collected and tabulated in *P. Mil. Vogl.* VII pp. 27–35. Payments in money made for animals or to drivers is a clear indication of hire.

⁶² *P. Mil. Vogl.* I 28, an account of barley, records its provision for horses on journeys made by Ptollarion to the metropolis.

⁶³ W. S. Bagnall, *The Archive of Laches*, 165. On mule breeding, see Sijpesteijn and Hanson, *P. Oxy.* XVI 1919 and mule-breeding?

⁶⁴ On accountancy practice on the estate of Aurelius Appianus, see Rathbone, *Economic Rationalism*, 331–87, esp. 331–5, which challenges the traditional view of Finley, *Ancient Economy*, 181, that 'Graeco-Roman bookkeeping was exceedingly

survive, and the size of the estate is difficult to gauge, but a revenue for the period of 78 000 drachmas, with expenditure of 56 400 and resulting profit of 21 600, suggests an estate of some size. The land-owners employed shepherds, masons, weavers, guards, animal-drivers, and other workers, some on a permanent basis, for monthly wages in money are itemized in the accounts. Casual labour was employed when required, especially at harvest time, and was paid pro rata. The estate had tenant farmers, and there is some evidence for payments made on their behalf.⁶⁵ Transport features often in the account, for the estate owned camels, donkeys, oxen, and horses, and payments are made to animal-drivers and account is made of disbursements of hay and fodder. The estate owned wagons and these, in one case, were used for the transport of wine.⁶⁶

Other documents provide some useful comparison. The earlier *PSI VI 688 recto* (dating possibly to AD 117, but certainly to the second century), in addition to other interesting points of detail, provides some evidence of transport on the estate to which it relates. Expenses cover the hire of 10 donkeys at the rate of 4 obols per day, and as they are transporting grain after winnowing, it is clear that they are supplementing the estate's existing animals during the harvest season.⁶⁷ Some days later, 8 other donkeys are hired, to supplement 'two donkeys of our own and another'.⁶⁸ Finally, *BGU I 14* (AD 255) records expenses, largely for casual labour, for an estate at Memphis. In one transport operation, 50 camel journeys are detailed, with 6 (but sometimes 4) camels working for 9 days carrying clay, perhaps intended for the repair of irrigation channels or for the construction of walls—heavy work at any rate, for which a rate of 6 drachmas each was paid (a total of 300 drachmas). In another task, 12 donkey-days of work were required of 2 animals, hired for 6 days for the transport of chaff from the village threshing floor to be used as fuel at a bathhouse. No doubt this task fell within

rudimentary, essentially restricted to a listing of receipts and expenditures', which he held reflected the simplicity of the economy as a whole.

⁶⁵ *P. Cairo Goodspeed* 30, iv. 22, and v. 2–4.

⁶⁶ *P. Cairo Goodspeed* 30, xxix. 21.

⁶⁷ *PSI VI 688 recto* col. ii 48.

⁶⁸ *PSI VI 688 recto* col. ii 49.

the normal duties of animals owned by the estate, but during the harvest season additional animals were required.

Fragmentary and limited these accounts may be, but they certainly complement the archives discussed above, and it is clear that the hire of animals supplemented the existing capacity of estate animals, allowing the estate-owners to maximize profits.

Smaller landowners and tenant farmers

It was not solely the owners of large estates who sought economically rational strategies in their approach to transport. Owners of small estates, tenant farmers, and even peasant farmers faced the same problems of limited resources.⁶⁹

Some 21 documents dating to the second half of the first century AD make up an archive relating to Soterichos, a farmer of fairly modest means. It is likely, but not directly documented, that he owned a small amount of land, but it seems that most of his income was generated by the produce of land leased from others. By leasing different plots of land, growing crops ranging from wheat to more high-yielding crops such as vines and date palms, and raising livestock, Soterichos was able to diversify. He may have owned some donkeys, but was able to find ways to spread the cost of ownership and investment through the purchase of shares in individual animals. One contract of sale details the sale of a part-share in a donkey foal.⁷⁰ The small number of animals he owned were grazed on state land which he sub-let, rather than use valuable and productive land.⁷¹ Finally, through careful negotiation with his landlords, Soterichos was able to transfer the responsibilities for transport onto them (contrary to the usual pattern), possibly in return for paying more rent. The transport of fertilizer and ploughing, so important to maximizing yield, and

⁶⁹ A good example is *P. Oxy.* VII 1049 (late second century), in which a tenant farmer hires donkeys in order to transport *χορτός* to the threshing floors at the village of Ophis over a four-day period. He hired 9, 12, 4 and 6 donkeys on consecutive days. This points to two things, first the donkeys hired must have been close at hand, and second, there could have been a fluctuation in the number of animals available for hire, perhaps affected by the demands of others.

⁷⁰ *P. Soterichos* 27 (AD 126).

⁷¹ *P. Soterichos* 5 (AD 94).

clearly important transport tasks detailed in evidence from other estates, had to be performed, and coming to such arrangements with landlords was, along with hire, simply another way of getting the job done.⁷²

Like Soterichos, the family of one Kronion, another farmer of modest means from the Fayum, leased land from several landowners. This land included a plot of 25 arouras of pasture land, suggesting that Kronion kept livestock.⁷³ That Kronion owned donkeys is shown by a petition he sent to the *strategos* of the Polemon *meris* concerning one of them, which he had left in the care of one Akousarion from the village of Tebtunis.⁷⁴ The donkey had run away, and Kronion petitioned the *strategos* to ensure its safe return, no doubt suspecting foul play. It is clear that the loss of an animal would represent a significant imposition on a farmer of little means.

Slightly further up the socio-economic scale, the veteran Lucius Bellenus Gemellus owned property centred on the village of Euhemeria in the Themistos *meris* of the Fayum. He was a man of some, but not great means.⁷⁵ Gemellus had a direct hand in the running of the estate, and penned a number of rather abrupt letters to his sons concerning incompetent handling of their responsibilities. He employed a donkey-driver named Herakleides and owned at least 10 donkeys, a yoke of oxen, and carts.⁷⁶ They were easily dispersed to the various plots making up the estate, all no doubt, fairly close by. The direction of transport resources on a small estate like this was clearly much easier than on the much larger estates of men such as Valerius Titanianus and Aurelius Appianus.

Finally, the archive of Aurelius Isidorus, which dates to AD 275–323, preserves information on the affairs of a reasonably wealthy family in the village of Karanis in the Herakleides *meris* of the Fayum. Isidorus possessed reasonably large amounts of land, certainly

⁷² In *P. Soterichos* 1 and 2 (AD 69 and 72), the landlord covers the cost of transporting fertilizer, and in *P. Soterichos* 4 (AD 87), splits the cost of ploughing. It is likely that Soterichos did not own oxen, and possible that the landlord supplied the animals, Soterichos the fodder, or some other such arrangement.

⁷³ *P. Kron.* 34 (AD 134).

⁷⁴ *P. Kron.* 2 (AD 127 or 128).

⁷⁵ See *P. Fay.* 110–23 (AD 94–110), with Hohlwein, ‘Lucius Bellenus Gemellus’.

⁷⁶ *P. Fay.* 111; 112 and 115; 119.

enough to qualify him for a number of civic liturgies. In AD 299 his estate comprised just short of 54 arouras, in AD 310 it seems that he had 140 arouras under cultivation, and after AD 310 this fell to 80. In addition to this, Isidorus leased small parcels of land from others, increasing the amount of land that he cultivated, and thus securing a steady income. It is possible that he preferred to rent more land than run the risk of trying to improve his own land, which may have been falling in profitability.⁷⁷ His resources were thus spread over a large area, which entailed problems of its own, principally of transport.

Aurelius Isidorus, and other members of his family, certainly owned animals. In *P. Cair. Isid.* 83 (second half of third century) the sale of a horse to Heron, who may have been the brother of Isidorus, is recorded. Ptolemaeus son of Pancrates, the father of Isidorus, is recorded buying a donkey on 24 October AD 267 (*P. Cair. Isid.* 84), and a mare on 23 July AD 275 (*P. Cair. Isid.* 85). Isidorus himself bought a female donkey foal in AD 309 (*P. Cair. Isid.* 86). In an inventory list of farm produce, animals and property, 2 donkeys, 2 donkey foals, and 1 young female donkey are mentioned.⁷⁸ Letters from the archive show that the animals were used to transport produce between plots making up the estate.

TRANSPORT AND THE LAND ECONOMY

Our survey of evidence from a variety of estates of different size has thrown up many similarities in approach to transport. From small concerns to very large, peasant to wealthy landowner, the amount of capital invested in transport animals was kept to a minimum, and the most efficient use made of existing resources. A private letter from Oxyrhynchos, perhaps written by a tenant farmer or even an estate employee, indicates that it was common for farmers *not* to own

⁷⁷ In *P. Cair. Isid.* 68. 12–15 (AD 309–10) Isidorus describes most of his 140 arouras as being out of cultivation—ἐν χέρσσι; see Kehoe, *Management and Investment*, 158–63.

⁷⁸ *P. Cair. Isid.* 136 (late third, early fourth century).

animals.⁷⁹ Only what was required for the average needs of the estate was kept, and additional transport was hired at busy times of the year, or even borrowed.⁸⁰ Centralized transport systems were part of estates that were run on economically rational terms.

But we must now turn to more general questions. How did transport fit into the agricultural economy overall? Was transport a specialism of a small number of transporters, or a part of the basic agricultural process, performed by farmers? How did transport demands fit into the pattern of the agricultural year? Who made up the labour pool of transporters? How were the demands of transport balanced with those of agricultural production by individuals? These are not easy questions to answer; our evidence falls short in the sense that the farms we know most about are not average, but those of rich landowners, and the complex accounts drawn up on these do not represent a norm. The 'normal' peasant landowner is a mystery; even if he or any member of his family was literate, they probably did not need to keep accounts, but would have been acutely aware of how precarious their situation might be.

When not engaged in agricultural production, transport, or other activities on their own land, individuals normally so engaged had the opportunity to pursue other means of income generation, and perhaps the most obvious way to do this was to provide transport for others. Post-harvest was the time when most agricultural transport had to take place, and there was surely an abundance of labour. As we have seen, state transport demands had to be met, and there is little doubt that this imposed a huge burden on the agricultural population. There is no direct evidence in our sources, apart from complaints about how onerous the duties were, of the effect that these demands had on the performance of transport tasks on private land holdings. We have seen that farmers transported their harvest in its entirety to threshing floors, and once the state had taken its tax in

⁷⁹ *P. Oxy.* XIV 1671 (third century), where the *dekaprotos* seems worried about the transport of tax-grain and pesters the farmers: ll. 10–17—'and now he worries us and the cultivators who have no animals, and worries us also about fodder and expenses. Send him [a certain Dionysios], for he knows the account, so that we may also get animals' (trans. Hunt).

⁸⁰ *P. Oxy.* LIX 3995 (third century) preserves a request to borrow a donkey to carry wheat.

kind, they were free to take what remained of their crop. Apart from those requisitioned for further state demands, animals and their drivers were then free to return to their usual tasks. These were manifold, from the delivery of grain to granaries or markets, preparation for the new sowing season, to the vitally important upkeep of irrigation works. But there were other opportunities. Labourers and animals could be hired out for additional work on estates belonging to others, for general transporting tasks, such as the carrying of letters and supplies for others so well documented in the papyrological record, and, of course, contracted transportation tasks as part of commercial transactions recorded in customs-house registers and receipts could be undertaken. But some balance had to be found between this and the essential needs of subsistence and agriculture, for, as Ringrose observed about agricultural transport in eighteenth-century Spain:

The conversion of such people into specialized transporters would have robbed farming of a large portion of its scarce animal power, destroyed the cost advantages inherent in the peasants' position as agriculturists with periods of seasonal idleness, disrupted the subsistence mechanisms of the countryside.⁸¹

Many variables come into play: the size of estate or plot of land, the size of the family unit based on it—which in turn determined the amount of available labour—animal ownership patterns, and the network of relationships between landowners in a region. These influenced the pattern of transport in the agricultural economy, and in turn dictated the ability of individuals to specialize in transport as part of other commercial ventures.

The estates that we have focused our attention on in this chapter were mostly extremely large, and were not the norm, except that generally, landholding patterns among metropolitans were such that a significant proportion of the land in those nomes for which we have evidence seems to have been concentrated in the hands of a few wealthy families.⁸² It is more difficult to assess the pattern

⁸¹ Ringrose, *Transportation*, 48.

⁸² Bowman, 'Landholding', has shown that in the Hermopolite land registers, there is great inequality of landownership among the residents of Hermopolis. The size of plots ranged from less than 1 aroura to over 2000. 48.6 per cent of residents owned

of landholding among villagers, but it seems the case that there was still inequality and a range of landholding sizes.⁸³ If this pattern is universal, it would have a significant influence on agriculture and its secondary economies, for it has been shown in comparative studies that as the size of farm units increased, the time spent in percentage terms in agricultural tasks increased, with a proportional decrease in the time spent on associated crafts and trades.⁸⁴ While it is certainly the case that no model can fully accommodate the complexity of any economic activity, it seems reasonable to accept that the larger the amount of land owned, the more intensive the purely agricultural tasks were, with a constituent decrease in the amount of scope to become engaged in other activities, such as transport. If it was the case that the majority of landowners owned smaller amounts of land, perhaps one-third owning plots less than 10 arouras,⁸⁵ then it was smallholders who could provide a pool of agricultural labour.

At this point, the size of families as economic units on land becomes important. It is not clear from our evidence how the level of agricultural activity affected the size of families, but it is clear that the larger the family on a limited amount of land, the greater the pressure to provide for it. There was a ceiling to the amount of arable work that needed doing, and when complete, or even when with larger families there was a surplus of labour at any given time, family members were free to engage in other income-generating activities, so necessary not just for subsistence, but also for the purchase of essentials and, importantly, the payment of additional taxes in cash.⁸⁶ They could manage land for others, or offer their services as labourers or transporters. So complex networks of relationships developed in agriculture. Large landowners such as Valerius Titianus or

3.7 per cent of the land, while 1.8 per cent of residents owned 36.6 per cent of the land. Similar inequality can be seen, as he points out, in the Fayum village of Philadelphia during the third century. See the comments of Rowlandson, *Landowners and Tenants*, 120–2.

⁸³ See R. S. Bagnall, 'Landholding'; Rowlandson, *Landowners and Tenants*, 123.

⁸⁴ D. Thorner, B. Kerblay, and R. E. F. Smith (eds.), *A. V. Chayanov on the Theory of the Peasant Economy* (Homewood, Ill., 1966), 101.

⁸⁵ Rowlandson, *Landowners and Tenants*, 123.

⁸⁶ Interesting comparisons on labour patterns can be found in L. Foxhall, 'Cultures, landscapes, and identities in the Mediterranean world', *Mediterranean Historical Review* 18.2 (2003), 75–92.

Aurelius Appianus relied heavily on the casual labour and availability of donkeys for hire among the smaller landowners living close by. No doubt their tenants could so provide, although there is good reason to believe that tenancy agreements in Roman Egypt allowed for much more independence on the part of tenant farmers than might be found elsewhere in the Mediterranean.⁸⁷ While tenants may not have been *required* to provide labour, it not only provided additional income, but was also in their best interests, for example in the maintenance of irrigation channels from which they would directly benefit. Tenants, therefore, provided a resource for their landlords, and animals they owned could be placed at the disposal of the landlord through hire; equally tenants could hire resources from their landlords, or provision for rent-free use of animals could be written into contracts.⁸⁸ While we should not exaggerate the level of dependence between landlords and tenants and vice versa, we should recognize that informal, and, on all but the largest estates, unrecorded arrangements existed.

CONCLUSIONS

Even in the fertile Nile Valley, agriculture was a tenuous exercise. Here, as in other parts of the Mediterranean, risk aversion was central to agricultural life. To this end, a wide variety of crops were produced on plots of land distributed over an area in small units, a feature of both large and small estates. This arrangement was enhanced by the practice and culture of inheritance, which had the effect of further splitting up land. The effect of this was to make transport a central concern of all farmers. Plots of land certainly could be reasonably close together (especially those of smallholders), and village threshing floors were often not far away, but it is still likely that animals were needed for transport. On the large estates like that of Appianus, transport assumed an altogether more important role.

⁸⁷ See Rowlandson, *Landowners and Tenants*, 221; elsewhere, see L. Foxhall, 'The dependant tenant: land leasing and labour in Italy and Greece', *JRS* 80 (1990), 97–114.

⁸⁸ *P. Oxy.* VII 1049 (late second century); *P. Oxy.* IV 729 (AD 137).

Thus there was a constant attempt to juggle the cross-cutting demands of risk aversion with the need to move produce from different parts of estates to the centre or to market.⁸⁹ But this had to be addressed along with the desire to keep capital investment in transport to a minimum, in an attempt to cater for one's minimum needs, and by supplementing resources at busy times of the agricultural year in order to cater for maximum needs. The result of this was that fewer animals were worked harder. Those linked to farms through ownership, through family ties, or those landless individuals we know so little of, when not engaged in agricultural production could be hired for labour. So too could those animals not always employed in agricultural work. The pool of labour and animals that existed as part of the land economy in slacker periods of the year made up the corps of animals and drivers available for state and private transport. As Ringrose has suggested for Spain, the great mass of transporters 'were farmers or farm workers who engaged in transport from two weeks to eight months of the year'.⁹⁰

⁸⁹ Risk aversion and transport were not only features of the agricultural economy in antiquity. Similar concerns can be seen in more recent periods, see the fascinating work of M. Petruszewicz, *Latifundium: Moral Economy and Material Life in a European Periphery* (Ann Arbor, 1996).

⁹⁰ Ringrose, *Transportation*, 50.

Conclusion

The papyri of Roman Egypt offer a rich picture of transport, and one that is valuable for assessing its role in the ancient economy as a whole. Transport and travel within Egypt show a high level of mobility and ‘connectivity’. The Nile united routes traversing the deserts and criss-crossing the Nile Valley with the *metropoleis*, Alexandria, and the wider Roman empire. Land routes were therefore part of a system of transport in Egypt based on the river. The importance of communication was recognized by the Roman government, not only in Egypt, but in the empire as a whole. On efficient communication rested imperial government, security, and economic prosperity (the feedback of profits to the centre).

We have seen that geography and topography had a profound effect on transport behaviour in Egypt. Pack animals assumed a dominant role, first because of the highly irrigated nature of the valley and Fayum, and second, in the desert, where the camel was the obvious choice for transport. Climate and topography also meant that oxen were used for agricultural tasks such as ploughing or turning irrigation devices, but seem rarely to have been used in desert environments; horses were used for riding only, and were comparatively rare. The corollary of this was that wagon use, although quite common, certainly had a secondary role in transport. Patterns of transport were also punctuated by the sequence of the agricultural year, and this largely depended on the annual Nile flood. The busiest time for transport fell in the period immediately after the harvest, when grain and other crops were carried to village granaries and store-houses or taken to the ports on the river for onward transport by ship to other locations in Egypt for trade, and to feed the cities of

Alexandria and Rome. But all had to be complete before the inundation, which at its height severely restricted travel in all but the desert fringes.

The evidence of papyri allows of some quantification. Animals were expensive, but perhaps of more significance were the associated costs of maintenance. This was a consideration of great importance not only to farmers with working animals, but also more specialized transporters engaged in the movement of commercial goods. Both had to provide fodder for their animals; the former from the produce of their land (although grazing was also important), the latter through purchasing. The necessity of carrying fodder on journeys was also a factor that had to be considered when undertaking long desert journeys, but was less of an issue for short journeys within the Fayum and Nile Valley, where fodder was readily available. Animal maintenance, therefore, had a clear impact on the economics of animal ownership. Such ownership was widespread, but we should be wary of accepting that it was the norm. Many farmers, and certainly residents of *metropoleis*, may not have owned animals, but may have had a part-share, or simply borrowed or hired them as required. There is evidence for the presence of animal-owners in cities (as is common still), where it is possible that animals might form part of a patrimonium, as well as a useful source of income if used for transport. In the unique village of Soknopaiou Nesos, this was certainly the case. Here, where land ownership was uncommon, investment in animals was important: 'Soknopaiou Nesos was not the village to be in if you were a farmer, but it might not have been a bad place for a priest or a camel driver.'¹

Much of what we know of animal ownership, however, comes not only from private letters and accounts, but more importantly from state-generated documentation. This provides important evidence for a crucial aspect of the Roman state's control and use of an important provincial resource. What is clear is that there was a distinct interdependence between the state and the private individual. The state kept no transport resources itself—there was no state-transport corps. The army possessed animals, but they were never used for anything except purely military purposes—riding and

¹ Hobson, 'Agricultural land and economic life', 108.

communication; even the supply of its units and the provision of animals to facilitate this seems to have been performed and organized by civilians either through contract or liturgical service. Instead of relying on its own resources, it suited the state to transfer the burden of its demands onto the local population of Egypt. This is not unusual for a Roman province, but the scale in Egypt was staggering. Arguably this was due to the importance of the Egyptian contribution to the grain supply of the city of Rome, and it is no coincidence that the movement of tax-grain was a central feature of transport. Few animal-owners would have escaped these demands. There were those who through liturgical service were bound to supply animals for state use, but when their contribution was not adequate, which seems quite often to have been the case, other owners were obliged to share the burden. Transport memoranda from the Fayum show a considerable movement of transport resources from other nomes to assist in the transport of grain in this large region, where land transport played a more prominent role, given its distance from the Nile. These animals belonged to villagers, peasant farmers, tenant farmers and even rich landowners (some of the ostraca form part of the body of evidence for the third-century estate of Aurelius Apollonios, indicating that even the wealthy could not escape these duties).

These state demands generated a large volume of documentation. Whilst we must be mindful that the amount of evidence we possess for the transport of grain, particularly for the Fayum, may exaggerate its overall importance, it seems clear that it was a central concern of the state. State demands in this respect were heavy, and additional impositions for imperial or prefectural visits, military supply within Egypt, military campaigns outside Egypt, and other contingencies, further added to the needs of the state. All of this required a complex bureaucratic structure. This was based on existing officials, supplemented by those with specific duties for transport. Within the nomes, *strategoï* were ultimately responsible for the coordination of transport among many other matters of economy and tax. But the most important role of state officials, the *strategoï*, and above them *epistrategoï*, was the appointment of liturgists to undertake state transport duties or provide animals. We have seen that this was carried out at village level by *komogrammateis*, and in the

metropoleis by *amphodarchai*, and was merely supervised by the more senior nome officials. *Sitologoi*, officials in charge of granaries, organized the day-to-day transport activities of the *annona*. The work of all these officials resulted in a vast amount of paperwork, which allowed their activities to be audited by senior officials. This is symptomatic of the high level of central control needed to coordinate transport resources across a number of nomes. There were variations in practice throughout regions, often influenced by local conditions, but the tenet remained the same: central authorities directed an operation dependent upon an imposition made on the local population. The result was a constant struggle against inefficiency; a common feature of our evidence is the failure of liturgists to provide the requisite number of donkeys, and in some instances a complete failure to provide any for transport operations outside their own nome (in these cases the Oxyrhynchite). There may be a number of reasons for this, and it is difficult to be sure of specifics when dealing with evidence anecdotal in nature, but surely the most likely is the conflict of interests which arose when the demands of the state clashed with the personal interests of individuals. The animals provided for state grain transport came from the same transport/labour pool that supplied the agricultural economy. There can be no doubt that in most cases a failure to provide animals was due to the demands for their use on the owner's own land, and there may have been additional pressure on resources in times of economic hardship.

Therefore, a central feature of transport in Roman Egypt is a perennial interplay between the public and private sphere. But inefficiency was not always caused by a private individuals' reluctance to provide service to the state; it was an inherent feature within the bureaucratic system itself. There was always a conflict of interest among state officials, and a central theme of a string of prefectural edicts is a desire to stamp out administrative abuses and malpractice. The very fact that such edicts appear time and time again indicates the failure of provincial government to solve these problems. The result of this is occasional changes made to administrative structures. These are difficult to trace with any chronological precision in the papyrological record, but it is possible to see definite clusters of such reform. Significant changes to taxation and bureaucratic structures

came in the reign of Trajan; some time in the second century the overall control of the *annona* devolved from the prefect to the procurator Neaspoleos—it would be tempting to link this to Trajan. In the third century, it is likely that Philip the Arab made far-reaching reforms, carried out through specially appointed officials, and these reforms may have seen the demise of the *sitologoi* in favour of *dekaprotoi*. New liturgies were developed—for example the rather obscure *rhabdouchia*—but the fundamental attitude of the state remained the same throughout the period, as much responsibility of administering and carrying out state transport was devolved onto the local population.

The provincial population, then, was directly affected by state transport demands and was heavily involved in them. But private individuals had other transport needs, not only around their landholdings, but also carrying produce to local markets. As we have seen, transport assumed an important role in the private sphere given the pattern of landholding, which saw the distribution of small units over sometimes fairly extensive areas. In the case of the largest estates, distances covered could be considerable. Therefore, strategies for transport had to be sought. Of greatest importance was the reduction of transport resources to their workable limits. The minimum effective number of animals was kept in an attempt to keep capital expenses low, which with small farmers might mean part-shares in animals or no animals at all. Animals and wagons were hired or borrowed to supplement existing resources at the busiest times of the agricultural year. These came from a pool of available labour, landless peasants or tenants seeking an alternative livelihood, farmers who owned small plots of land perhaps sufficient to provide some means of subsistence but not enough to require constant attention (freeing them to pursue other means of generating income) or perhaps members of large families whose land could not provide for all. This labour force is not well represented in our evidence, but must have been considerable in size. On it depended the owners of not only estates, but also their tenants, and even owners of small plots. Where some of the agricultural labour force might be involved in the manufacture of a various range of goods, others might provide other services such as guarding property, and others still became transporters. These secondary economic functions generated

additional income and also enabled owners to keep animals throughout the year. Any animals owned, then, were kept busy; busier perhaps than their counterparts in other regions of the Mediterranean world.

Agriculture was not the only aspect of economic life in Roman Egypt to benefit from this pool of casual labour. Trade played an important part in the economy of Egypt, not only in the Nile Valley, but between it and the oases of the Western Desert and ports of the Red Sea. In the case of the Western Desert, transport provided a year-round source of work, and when not engaged in farming their land or hampered by the Nile flood, which could mean perhaps as much as 8 months of a year, individuals could act as transporters for those engaged in trade. These transporters are well documented in customs-house registers. But it is important to note that many such individuals were not what might be classed as specialized. If they had been, this would have had a profound effect on the availability and flexibility of transport with the agricultural economy.

But specialists there were. They can be traced, as we have seen, in the Fayum customs-house registers, but are most notable in the Eastern Desert: specialist transporters such as Nikanor and his associates, who owned a considerable number of camels, were heavily engaged in transport. They were outside the agricultural economy and spent most of their time travelling the routes between Koptos and the Red Sea. Given the demand for transport, perhaps 2000 loads per month at the Red Sea ports, it is likely that Nikanor was constantly busy, and importantly, he was not alone. The archive of ostraca relating to him offers a small chapter of personal history about one individual among many. We should not worry that the rate of attestation of such individuals bears little relation to the scale of their involvement in the transport of trade goods: absence of evidence is not evidence of absence. What we would like to know more about in relation to transporters like Nikanor is how they responded to fluctuations in the intensity of trade with the east or levels of military or quarrying activity in the region. In the Western Desert, levels of activity were constant, for the population of the oases was permanent. Here a steady level of work for specialist transporters was possible. Arguably income levels would have been lower, for there is little doubt that transporters knew the value of the Eastern Desert cargoes and transport rates were adjusted accordingly.

Transport was clearly an important factor in commercial activity in these marginal regions. Where traders could not provide their own transport, there was a ready supply of specialists. The state recognized the importance of trade in the Eastern Desert, and provided an infrastructure to facilitate it and the military protection it demanded. This is another clear example of the interplay between the public and private spheres. Essential supplies were transported to military units based in the desert and to the communities at quarry sites, principally Mons Claudianus and Mons Porphyrites. Animals were requisitioned in order to perform this transport, and this must have had a significant impact on available transport resources in other parts of Egypt, which were overstretched already. State demands provided opportunities, and secondary economic transactions could 'ride on the back' of state impositions.

One important feature of the ancient economy needs emphasis here, for it is certainly implicit in all that we have considered: that different aspects of economic activity were highly integrated. Land ownership, production, manufacture, commerce and transport were interlinked; they often depended on the same labour force, the same transport resources, and existed alongside (and often were dependant upon) state interests and infrastructures. Opportunities existed for all concerned, rich landowners, rural workers, animal-owners, and even state officials (including the emperor) to exploit a complex range of relationships to engage in economic activities.

Several principal themes run through this book. The first, the pool of transport resources available, has hopefully been demonstrated, as has the second, the interplay between the demands of the state and the interests of private individuals. The third, the role of transport in the ancient economy, is crucial. Evidence from Egypt is central to our understanding of this, and it is to the detriment of previous scholarship that it has been ignored. Certainly there were state-driven economies of transport—the moving of tax-grain, the transport of stone in the Eastern Desert. These are prime examples of the economy of imperial exploitation, of the economic behaviour associated with the demands made by an imperial power on its provinces. But they built on an *existing* transport infrastructure and pool of resources. We have established that transport was of clear concern to landowners, and despite the unhelpful comments of Roman

agronomists like Cato, efficiency and cost-effectiveness were possible and sought by landowners. We have noted also a number of examples of landowners being directly involved in the marketing of their produce, not only at local markets, but further away. The first-century landowner Athenodoros and the third-century Aurelius Appianus (demonstrated forcefully by Dominic Rathbone) provide paradigms for this economic phenomenon. They cannot have been alone. Landowners made economically rational decisions about transport, as well as actively marketing their produce. They made attempts to cut capital outlay and to maximize profit. These facts run counter to the primitivist model of the economy advocated by Finley and his followers. Transport of low-value bulky products by land did take place, not only where there was an absence of navigable water, but often through choice, and often as part of a *system* of transport which included land and water. It seems clear also that the opportunities to profit from trade, shown especially in relation to the luxury trade with the east, were attractive to those able to invest wealth in this. Social status was no bar to activity, and even the emperor was involved through his agents.

Notions that transport in the ancient world restricted the ancient economy should be put to rest. It is too negative to view transport in the Roman world as a failure, and the question of how it might have restricted the economy is not the appropriate one to ask. Instead, what we have to assess and explain, and what this book has tried to tackle, is the evidence for what *happened* in terms of transport and economic activity, rather than what ancient (or modern) writers perceived as an ideal. The economy was not primitive, neither was transport necessarily any more inefficient than it was in the Middle ages. No one would deny the importance of trade in later periods (even if similar social stigmas were still prevalent), so why do so in the Roman, when levels of population were high and thus levels of demand were similarly so. It was demand that generated trade, and the feasibility of transport depended ultimately on whether the market could support its cost. It is clear from the evidence of Roman Egypt that it could. Theories on the role of transport in the economy of the Roman empire should not be built on the shaky foundation of Cato's advice on farm management (which, at any rate, is more of a treatise on the ideal Roman landowner than

practical advice) or on misunderstood imperial edicts. It should be based on the evidence of what happened in reality, and papyri are the best guide to this. But that is not to say there is no mileage in our literary sources, for Strabo, in his description of trade in Gaulish pottery in Italy, noted that the roads of Italy could 'carry boat-loads'.² It really is a question of not molding our evidence to suit preconceived ideas or models.

² Strabo, 5. 235.

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